POPULATION DYNAMICS IN INDIAN STATES

K. Mahadevan

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Population Dynamics in the Indian States

Fertility and Family Formation

and

Mortality and Life Affecting Variables

K. MAHADEVAN

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Introduction

This book is the outcome of a major National Study that was carried out in 1984 in the three major regions of India on determinants of fertility, mortality, their interaction and the demographic transition, besides the trends and differentials of these vital events. The location of the study includes the Northern, South Central and extreme Southern regions represented by Uttar Pradesh (UP), Andhra Pradesh (AP) and Kerala states respectively. These three regions manifest more or less different cultural patterns, levels of development and different trends in demographic profile of the heterogeneous and composite culture of India. Uttar Pradesh represents the traditional culture of Northern India with less socio-economic development and the highest level of fertility and infant mortality. Andhra Pradesh is one of the developed states in India, next of course, only to the Punjab, Haryana and Maharashtra in the fields of agriculture and industry. Demographically, A.P. falls in between U.P. and Kerala states. But the people of this state are only moderately modern and manifest several traditional life-styles and behaviour. Kerala, on the other hand, though economically backward when compared to A.P., is far ahead of all the Indian states in terms of the level of modernization and social development. Her fertility and mortality are the lowest in India. According to the 1981 census, the crude birth rates in Kerala, A.P. and U.P. states were 25.6, 31.7, 39.6 and death rates 6.6, 11.1 and 16.3 respectively (1981 census). For the whole of India these rates during the same period were 33.9 and 12.5 respectively. Infant mortality rates by 1981 were 37, 86, 150 in the states of Kerala, A.P. and U.P. respectively, and 110 for India as a whole. The range of total fertility of these states was 2 to 3, 4 to 5 and 5 to 6 in Kerala, A.P. and U.P. respectively. On the social front, while 70 percent of the people in Kerala are literate, only 29.9 percent in A.P. and 27.2 percent in U.P. and 36.2 percent at the all-India level fall under the same category. Regarding the literacy of women, more or less the same trend is noticed: in Kerala it is 64.5 percent, 20.5 percent in A.P. and only 14.4 percent in U.P. as against 24.8 percent at the all-India level. Economically also these states differ in several aspects. Regarding per capita income, it is Rs. 667 in Kerala, Rs. 718 in A.P. and Rs. 510 in U.P. while it is Rs. 720 for India at constant prices by 1981-82 (CSO). As for the people below the poverty line, U.P. is far above these states with 50 percent of population below it, followed by Kerala with 47 percent and A.P. with 42.2 percent; the percentage at the all India level being 48.1 percent (CMIE, 1983). The mean age at marriage of girls is the highest in Kerala, i.e., 21.9 followed by U.P. (18.3) and more or less the same in A.P. (17.6) and 18.7 for all India level. The mean ages of fertility in Kerala (27.5), A.P. (24.5) and U.P. (29.6) states and India (28.4) by 1981 were also very much different. All these data vividly reflect the existing diversity of the states that are considered for the study. However, the present study does not cover the Western and the Eastern states of India, because they have vital events which are more or less similar to U.P. and A.P. states. Further, culturally and on the level of development, many Northern states, viz., Bihar, Madhya Pradesh, etc., are much closer to U.P. state. The other reasons for excluding some of these states were financial constraints, and operational difficulty. However, some of these states, notably Bihar, Orissa, Rajasthan, Gujarat and Maharashtra, were taken up for demographic study during early 1980s by the International Institute for Population Studies, Bombay. Moreover, so far, no National Study was undertaken covering the three major natural regions of India from the South to the North. Hence the present effort if considered, to be by and large an innovative approach and the findings may more of less reflect the country as a whole.

Theoretically too the present study is very valuable, because we have considered fertility and mortality together, taking into account their determinants and inter-relationships. Since these two major vital events are studied together regarding their trends, differentials and decline as noticed in Kerala, A.P. and U.P. states, as shown above, they may help to explain the pattern of demographic transition that is taking place at different stages in the major regions of India. It is assumed that U.P. is at the beginning of demographic transition, A.P. still at later stages and Kerala at the lowest level of demographic transition. While Kerala has the lowest CBR of 25.6 and CDR of 6.6 A.P. manifests an intermediate level of birth rate of 31.7 and CDR of 11.1, and U.P. presents the highest level of these vital rates, viz., 39.6 and 16.3 respectively. The results of the study have revealed more precisely the inter-state and intra-state variations in these vital events and the ecological, cultural, development and demographic determinants of differential fertility which have very great implications for theoretical understanding of the direct and indirect, proximate and remote factors that influence fertility behaviour. Thus, it also enables us not only to examine demographic transition empirically in India but also to conceptualise the major determinants of fertility and mortality. Added to these, special emphasis and efforts are made to identify and test the "life-affecting variables" that influence infant mortality according to the analytical and conceptual model developed by Mahadevan (1986).

On the programme front several ideas have been generated which have policy relevance and utility for strengthening and rationalising the inputs for the overall efforts of population control in India. In the present study, for the first time, unlike several earlier fertility and mortality studies, rates have been calculated on the basis of district, religion and caste within each state. Such an effort has already generated meaningful and valuable findings for the benefit of the recently proposed new population strategy of the Government of India (1986). In a policy meeting of the Central Health Ministry we could impress upon the Ministry the need for decentralising the implementation of the new population control strategy at the District level itself instead of taking the state as a unit for this purpose. This recommendation was made on the basis of this study which revealed the differential fertility and mortality at the district level within each state. For example, CBR in the districts of Kerala range from 24.6 in the Trivandrum district to 29.4 in the Alleppy district and 29.2 in Palghat areas. Similarly, in A.P. it was 24.3 in the Guntur and 38.4 in the Kurnool districts. In U.P. it ranged from 34.0 in the Gorakhpur district to 35.2 in the Jhansi area. All these conclusively confirmed the need for decentralising the new policy on population control and taking the district as a unit of planning and implementation, because in all the three states significant variations in birth rate is noticed across different districts. Surprisingly, the Guntur district in A.P. and the Trivandrum district in Kerala have similar birth rates, though A.P. state has significantly higher birth rate than Kerala state. Another such finding is that the Muslims do not have uniformly high fertility all over India. Their birth rate is the highest in U.P. (37.7) and the second highest in A.P. (43.0) next only to the Christians (51.0). It is second highest in Kerala state (28.4) next to that of the fishermen (38.7). Many such valuable findings can be seen throughout this report.

This book is divided into three parts and each part contains several chapters. The three parts include: (1) the trends, differentials and determinants of fertility, completed fertility and the same of (2) mortality; and (3) interrelationship between fertility and mortality. The fertility section is further divided into several chapters, viz., nuptiality and fertility, fertility and demographic profile; cultural factors, socio-economic status, breastfeeding, family planning, determinants of completed fertility and path analysis on fertility, summary and implications and a strategy to promote family planning among the Muslims. The mortality section is again presented in ten chapters. They include: (1) mortality trends and differentials; (2) demographic variables; (3) socio-economic status; (4) ecology and mortality; (5) health delivery system; (6) nutritional status; (7) breastfeeding; (8) causes of death; (9) path analysis on major determinants of mortality; and (10) summary and implications. The third section specifically examines the factors like (a) insurance effect, (b) replacement effect, (c) compensation effect of mortality on fertility behaviour and (d) unwanted babies. A micro-level and holistic study of three villages have also been made from these three states, but they are published separately. If at all any omissions and commissions that might have arisen in the large-scale survey on the basis of which the data has been presented in the first three parts of the study, the village study may bridge such gap of information.

II. EARLIER EVIDENCE

Fertility

In India only a limited number of major fertility studies have been carried out, so far, and they are mostly localised research in different states, metropolitan cities or specific ecological regions and communities. They include: Parsi Demography (Chandrasekhran, 1952), the Mysore Population Study (UN, 1961); Differential Fertility in Central India (Driver, 1963); Fertility Differentials and Determinants in Kerala (Namboodiri, 1960); Demographic Study of six urbanised villages near Delhi (Agarwala, 1970), Demographic Survey of Six Rural Communities in Maharashtra (Dandekar, 1959); Variations in Fertility between Two Generations in Kerala (Kurup and George, 1969); The relationship between family type and fertility in the West Bengal regions (Pakrasi and Malekar, 1967; Nag, 1965); Family structure and fertility in Orissa (Bebarta, 1964); Fertility and Family Planning in Greater Bombay (Rele and Kanitkar, 1980); Sociology of Fertility: Determinants of Differential Fertility in South India (Mahadevan, 1979); Fertility and Family Size Norm in Bangalore City (Srinivasan *et al.*, 1978); Study of Fishermen Community in Coastal Andhra Pradesh (Murthy, Mimeo.); Determinants of Religious and Caste Differentials in Fertility in a village in Rayalaseema region of A.P. (Mahadevan, 1986); Socio-psychological Determinants of Urban Fertility (Reddy, 1986); Demographic Transition in Kerala (Kurup, 1988); Factors in Fertility Decline in Kerala (Nayar, 1986); Child Labour and Fertility in Andhara Pradesh (Naidu, 1986); Cost of Rearing Children in A.P. (Usharani, 1986); Fertility Behaviour in Villages of Karnataka (Caldwell, *et al.*, 1985); and Population and Social Change in an Indian Village (Aiyappan and Mahadevan, 1988). All these studies either focus attention on certain communities, village(s), urban areas of a certain region or do comparative studies of urban and rural areas; some of them cover one or more districts in a given state.

However, during the early 1980s, the IIPS carried out a study covering a few states in the Northern region of India including the Maharashtra, Gujarat, Rajasthan, Bihar and Orissa. It is the only large scale fertility study, other than the present effort, so far, done in India. But even that study concentrates mostly on similar situations, execpt in the case of the Maharashtra state, which is demographically, agriculturally and industrially a progressive state. But it studied the determinants of fertility and family planning mostly on conventional lines. As usual it followed the survey approach and studied the socio-economic and demographic variables affecting fertility behaviour. Another interstate study was promoted by the World Bank in Kerala and Karnataka. The report of these studies were published as independent books on Kerala

(Zachariah, 1983) and Karnataka (Rao *et al.*, 1986) by the respective research teams. These studies also fall under the category of major survey approaches focussing attention mostly on conventional factors. Another recent comparative study between the states of Kerala and A.P. was carried out very recently (Mahadevan and Sumangala, 1987) using a combination of anthropological and survey approaches. In this study, for the first time, the couple as a unit was considered and several new case histories, which contain many rare and new determinants of age at marriage and fertility were developed. This innovative study has identified the importance of many new determinants of fertility behaviour, viz., differential influence of value of the first and second sons on fertility behaviour, polyandry and low fertility, social obligations, late marriage and low fertility, modernization, high status of women and low fertility, communication and contraception, differential service of the primary health centre staff, importance of the Anganwadi programme, etc.

Knowing the repetitive focus of the several earlier studies, many innovations have been introduced in the present study. First of all, it is the only major study, so far, carried out in India on determinants of fertility and mortality taken together and studied among the same sample. It has taken into account the geographical, ecological, cultural developmental and demographic differences of India's population under the overall framework of the study. This study has followed a combination of the theoretical basis, viz., (i) demographic transition, (ii) testing of the life affecting variables (LAVs) and (iii) all the latest and new conceptual thinking on determinants of fertility behaviour (Ruth, *et al.*, 1983; Easterlin, 1975; Bongaarts and Potter, 1983; Mahadevan, 1984 and 1987). In fact, the present study was launched only after identifying the locally relevant and important determinants of fertility and mortality in all the regions through an "in-depth study" of several cases, which helped to avoid their omissions in the major survey and to confirm their importance. Another speciality of this study is that, in addition to the in-depth study and large scale survey carried out, supportive case studies of three villages and families have also been completed in detail to supplement the major survey and thus bridge the gap of information on many determinants of fertility and mortality which may have been otherwise left out unwittingly. However, the report of the village study would be published separately since it is an offshoot of the major study and it does not fully fit in with this book.

Mortality

Most of the mortality studies carried out in India happen to be smalle scale surveys which focussed on a few villages, or districts with the exception of a single study sponsored by WHO on "Family Formation Pattern and Health". Many items of literature available on mortality are based on secondary sources of data, like the census and sample registration scheme (Desai, 1978; Kohli, 1977; Jain, 1974; Agarwala, 1975; Chandrasekhar, 1972). However, a few studies on mortality have also been made using primary data, which explain more valuable factors than the preceding literature did for an understanding of the diverse and important determinants of mortality (Mahadevan, *et al.*, 1985; Smucker, *et al.*, 1980; Simmons, *et al.*, 1979; Omran and Standley, 1976; Ruzicka and Kanitkar, 1973; Wyon and Gordon, 1971). Except for the four studies carried out in Punjab (Wyon and Gordon, 1971), U.P. (Smucker, 1980; and Simmons, 1978), Tamil Nadu (Omran and Standley, 1976) and Andhra Pradesh (Mahadevan, *et al.*, 1985), all the other studies contribute a limited category of socio-economic and demographic variables and in a stereotyped manner. Analysis of the secondary data also covers mostly these variables. But the four major studies mentioned above focus attention on a wide spectrum of priority areas of investigation. Gordon and Wyon give importance to the social structure of villages and priority to variables like pregnancy, parity, post-delivery aspects, crucial causes of death, breastfeeding and supplementary feeding and their influence on mortality. Similarly, Smucker and Simmons *et al.*, also have gone into the details of infant mortality; they have rightly identified the pivotal role of tetanus as a single major killer of babies in U.P. They made only a large scale survey and have confined themselves to a few villages for studying infant mortality as in the case of the Khanna study (Punjab). On the other hand, Omran, Standley and their collaborators from the Gandhigram Institute in Tamil Nadu in their study have gone far beyond the scope of the preceding studies conducted in the Punjab and U.P. Their study analyses almost all the then known major determinants of mortality. A major thrust of this project was to identify the interrelationship between mortality and fertility. This study, accordingly, has confirmed this hypothesis. It also has confirmed the adverse health status of the mother as a result of several deliveries and of rearing of a large number of children. A speciality of this study is that it was carried out by an inter-disciplinary team, which designed the study in a comprehensive manner, on a comparative and cross-cultural basis in a few selected developing countries. In the light of these experiences, the study carried out in Andhra Pradesh has considered most of the major determinants of infant and childhood mortality, besides giving equal emphasis to determinants like cultural practices, socialization and nutritional status, which were not given adequate emphasis in most of the earlier studies. It makes a major theoretical contribution by differentiating between the separate causes of mortality of infants and children. It concludes that, "considering the preceding discussion and comparing the causes of mortality among infants and children, it may be generalised that infant mortality is caused largely through bio-familial variables and childhood mortality by the familio-environmental variables". This generalization, according to Joe Wray, can be applied to all over the world since the role of environment becomes more relevant for mortality among children than infants, who are often reared by the parents within the four walls of the houses only (Personal discussion in 1983). Another innovation of this study is that a few case studies of families where more mortality happened among Muslims, Harijans, and Caste Hindus, were studied in detail for the first time. The present study has taken clues from all these contributions and also from several other major studies carried out in other countries. (Mahadevan, 1985; Chen, 1983; Mosley, 1979; Preston, 1976; Wray,1977).

The present study has several innovative features compared to the earlier ones. It is proposed with the assumption that the influence of mortality on fertility is a major and important determinant. Evidently the existence of high mortality and fertility in Uttar Pradesh and low mortality and fertility in Kerala support this assumption, at least tentatively. But the present empirical study has conclusively proved this assumption and also established the nature of the linkages that exist between these two vital events. Further, a combined study of various determinants of fertility and mortality among the same population, will reveal the common and different determinants of these two major vital events. Such information will be valuable in manipulating these factors using the same or different inputs. If the same input can manipulate the fertility and mortality changes, considerable reduction in investment and increase in efficiency of managing the programme can be achieved. Further, the linkage between these two vital events can be manipulated to the advantage of both fertility and mortality control. In India, so far, no study has been carried out, considering these objectives and taking the two extreme and middle level states in the field of development and demographic parameters. In both these aspects U.P. has the highest fertility, mortality and lowest level of social development, as against Kerala which has the lowest level of these vital events with a very high degree of social development. Andhra Pradesh falls in between these two states in most of these aspects.

Fertility-Mortality Interaction

During the last twenty years or so there has been much cotroversy about the nature of the relationship between mortality and fertility. As early as 1961 Ronald Freedman wrote that a decline in mortality must eventually produce a decline in fertility, but he commented that very little systematic empirical work had been done on the subject. Davis and Notestein expressed that preindustrial societies would go through one means or the other to evolve normative practices that assured high average levels of fertility. Such levels would be necessary to counteract high mortality without them, a society was doomed to extinction. Historically, data from several European countries show a certain relationship between fertility and mortality (Preston, 1975). However, in later years, Preston wrote that only a small fraction of mortality and fertility variation at the family level seems to translate into fertility variation.

Several others, while examining the relationship between mortality and fertility in developed and developing countries, showed that there was a significant association between these two vital events in 74 less developed countries (Lapham, *et al.*, 1975). Again Lesthaghe (1975) in Belgium, Iskandar and Jones (1975) in Indonesia, United Nations Department of Economic and Social Affairs (1972), Agarwala, (1975), Mahadevan, *et al.*, (1985) in India, and Adlaka (1970) in Turkey have showed the existence of an association between these two vital events. The association, according to some of them, is uni-directional but to others it is a reciprocal relationship. However, there is evidence that does not fully support the association existing between mortality and fertility. This points out the need for further research which uses rigorous methodologies. The existence of relationship between these two vital events is due to several specific factors which are now fairly agreed upon by many people.

What specific explanations are there to support the existence of influence of mortality on fertility? They can be classified under three broad categories: The death of a child shortens the amenorrhoea associated with lactation and thereby increases fecundity and shortens intervals between two consecutive births. According to Preston (1978), this effect is not largely based on empirical evidence. A second explanation is that parents are motivated to have additional babies to replace the loss, i.e., "Replacement effect." A third and more extensively held view is that parents do not limit their children until they are reasonably sure that a sufficient number will survive to adulthood. This is called the "Insurance effect". While discussing the relationships between fertility, child mortality and nutrition in Africa, Jacqueline (1977) concluded that malnutrition was largely responsible for excess mortality among children. This results not only in a certain increase in fertility linked with the discontinuance of breastfeeding, but also the parents' desire to replace the deceased child with another. The same view has been expressed by Lachtig, *et al.*, (1977): "The reports available and our own data support the hypothesis that short and long term nutritional status of the mother are causally related to infant mortality and are in part responsible for the association between socio-economic status and infant mortality".

The preceding conclusions lead to another probability; that most people who suffer from normal nutritional deficiency are poor people who have a large number of children. Of course, there are other causes for nutritional deficiency. Therefore, higher fertility coupled with deprivation of adequate food, particularly for girls, together may cause the nutritional deficiency which leads to mortality. Hence, there is a link between fertility and mortality through food availability and customs of food distribution. High infant and child mortality is considered one of the determinants in the adoption of small family norms in developing countries, because successful reproduction requires high fertility to offset high mortality (Davis, 1945; Notestein, 1945). There has been an increased realisation that reduction of infant and child mortality is a necessary pre-condition for the acceptance of small family norm in developing countries (Taylor *et al.*, 1978 ; Chaudhary, 1982).

Chaudhary (1982) observed that infant and child mortality may affect the level of fertility by means of biological replacement and insurance effect and also by social norms and dependency ratio. He is of the opinion that, on account of high mortality, parents may strive to have additional births and the fertility level may be increased. Schultz (1974) found a clear statistical relationship between mortality and fertility in several developing countries. By examining retrospective pregnancy histories, Adlaka (1970) in Turkey, Wyon and Gordon (1971) in India, Harrington (1971) in West Africa and Rutstein (1974) in Taiwan, Khan (1973) in Pakistan, Chaudhary *et al.*, (1975) in Bangladesh found higher fertility among women who had lost their children and concluded that the observed differentials in fertility were due to a desire to replace the children who had died.

III. THEORETICAL BASIS

To study fertility behaviour, a thorough review of all the major conceptual models has been attempted (Davis and Blake, 1956; Freedman, 1961; Fawcett, 1972; Easterlin, 1975; Bongaarts and Potter, 1983; Mahadevan and Sumangala, 1987). In the light of these theoretical developments and on the basis of our in-depth study, suitable variables have been considered. Appropriate factors from most of these models were included, keeping in view the cultural diversity, differential levels of development and regional variations of the communities studied. Another recent comparative fertility study completed by this author (Mahadevan and Sumangala, 1987) was also found valuable for the purpose of selection of the appropriate factors for the present study; a new conceptual model developed through this research is found to be particularly relevant for a developing country like ours. Hence the major thrust of this project depends on our own conceptual model though its evolution has also been influenced by the existing theoretical developments in this direction.

For the study of mortality, the theoretical basis is mostly dependent on the "Life Affecting Variables" (Mahadevan, 1984) and the conceptual models developed by this author. Of course, the classical demographic transition theory is also considered to explore its relevance in the changing demographic profile of Indian states. For establishing the influence of mortality on fertility all the available theoretical developments in this field have been considered (Chaudhury, 1982; Preston, 1978; Mosley, 1977; Schultz, 1974).

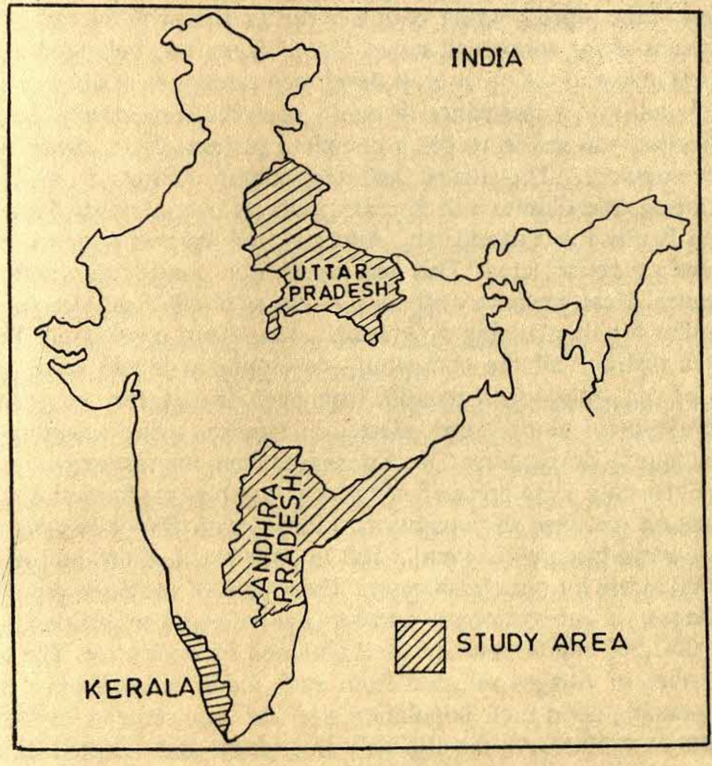
IV. METHOD, AREA AND SAMPLE

A combination of approaches in demographic study is considered here along with the long term experiences of the principal investigator, to explore all the salient determinants of the vital events. Since the author believes in an in-depth exploratory study before commencing any major survey, it was carried out as an essential first step in our overall research process. The in-depth study gave sufficient insight into the issues involved in the entire spectrum of research. Following this a major survey was evolved and, as a supplementary to the survey, a parallel case study of limited villages and families was also undertaken to enhance the depth of the study.

Objectives: The major objectives of the present research are to study: (1) the levels and differentials in fertility and mortality and their inter-relationships; (2) the regional and culture-wise differences in the determinants of fertility and mortality; (3) the trends and changes in the status of women, age at marriage, norms and values, modernization and their differential influences on fertility and mortality; (4) food, status of health, nutrition, environmental factors and their influences on mortality; (5) influence of life affecting variables, intermediate variables and other determinants on these vital events relevant to the population under study.

Sample Frame and Size

From the three states, of U.P., A.P. and Kerala, a total sample size of 6,500 eligible women, that is, women in the reproductive period living with their husbands and also having one or more children, have been considered for the study.



States	*Eligible Women*
Uttar Pradesh	2,000
Andhra Pradesh	2,000
Kerala	2,500
Total sample	6,500

A sample size of 2,000-2,500 is considered for getting an optimum number of live births and infant deaths, particularly from Kerala, where the rates are very low. A sample size of this magnitude is a minimum requirement. Increasing the sample is good but that would shoot up the total budgetary requirements.

For the selection of sample, at the first stage, two districts each were selected purposively from U.P., A.P. and Kerala, keeping in view of the representative nature of the districts with the rest of the districts of the concerned states. Out of them, one belonged to the developed and the other least developed categories of districts with high and low performance in family planning respectively. Such a selection was made to get a complete picture of the diversity in development. The Jhansi and Gorakhpur districts from Uttar Pradesh, the Guntur and Kurnool districts from Andhra Pradesh, and finally the Trivandrum, Alleppey and Palghat districts from Kerala were selected. This was finalised in consultation with the Central Health Ministry officials. As far as possible districts having similar family planning programmes have been considered. From each district, all the community development blocks have been listed out separately. Secondly, from each district, two community development blocks were selected at random. After selecting the community development blocks, villages from the respective blocks in each state were grouped separately into big, medium and small sizes on the basis of population. Villages with 500 or less population were grouped as small, 500 to 3,000 as medium and above 3,000 as big for our classification. From each of the three groups of villages, a proportionate number was selected at random, till 2,000-2,500 eligible women were obtained for each state. The total number of villages selected from each block varied from 4 to 6 depending upon their population size and requirements of sample from each place. All the eligible women from such selected villages formed the respondents. Thus, a multi-stage sampling procedure was followed for selection of sample size.

Instrument and Data Collection

A schedule was developed and used for data collection. To supplement the schedule and improve the quality of data, non-participant observation was also used. Anthropometric measurements were adopted to study the nutrition and health status of children and mothers, besides observing and asking questions on health status of the eligible women. Clinical analysis of blood was carried out only for the villages considered for the in-depth study. An earlier mortality study carried out by us (Mahadevan, *et al.*,

1985) proved that anthropometric measurements and clinical examinations equally predicted the nutritional and health status. For the study of food choice, an approved method used in dietary survey was followed. Thus, we have used a combination of different tools for gathering data on different variables. For efficient data collection, four female data interviewers in each state were employed. The number of interviewers was restricted in order to minimise non-sampling error. The interviews were directly supervised and assisted by one research officer, the principal investigator and his team of collaborating faculty members. The collaborating faculty members extended all help and were responsible for the overall supervision of the survey in these places, besides the research officers. The principal investigator periodically followed up the survey team and maintained close supervision to prevent any lapses on the part of the investigators.

Analysis of Data: The data have been analysed using computer facility. Several types of tables have been used for presentation of data. In addition to these tabulations, regression and path analysis have been utilized to identify specifically the individual influence of various independent variables, their combined influence, besides knowing their direct and indirect effect on the dependent variables. The x^2 - test and Z - test were also adopted to test the differences and associations in mortality and fertility.

PART-I

FERTILITY AND FAMILY FORMATION VARIABLES

1

Nuptiality and Fertility Behaviour

– K. Mahadevan & Sushma Tiwari

Throughout the documented social history of India, marriage has been sanctioned and approved for one and all, irrespective of the cultural variations of different communities. However, marriage patterns and the rituals associated with them have varied through the ages. Even from the period of the Rigveda, marriage was a social necessity aimed at performing certain "Sacrifices to the Gods and to procreate sons" (Kane, Vol. II.I,1974: 428). Depending upon the caste background and regional variations in India, marriage forms a complex or a simple social institution. Throughout India, the rituals and elaborate functions of marriage demonstrate very great complexity among people of the higher caste whereas it is reduced to a simple function for people of the lower caste. There are certain common characteristics to marriage all over India. Marriage selections are very often made endogamously (within the same caste) on the basis of caste, exogamously, the residential villages and among people of the same village. Marriages held outside one's own caste have been frowned upon by the people of almost all castes, except among the Harijans, who form the lowest social stratum and have very few functions associated with marriage. But most tribals in India stipulate definite endogamy or exogamy as a norm for their marriages. These ancient customs are more or less followed similarly in all the three regions and among most communities that we have chosen for study.

Marriage between relatives is also permitted since the time of documented history and the same custom is followed even today. But there are differences in the selection of relatives for accepting a bride or bridegroom. Such differences are noticed among the people of U.P., A.P. and Kerala in India. According to our findings, 94 percent of marriages in U.P., 60 percent in A.P. and 79 percent in Kerala were solemnised between non-related brides and bridegrooms. It is revealed that marriage among related people is more common in A.P., less in Kerala and negligible in U.P. Marriage among relatives is restricted to different categories in these regions. While marriage of a girl with her maternal uncle is common in Andhra Pradesh, though infrequent nowadays (6 %), it is almost prohibited in U.P. and Kerala. While marriage with all other relatives is generally prohibited in U.P., in A.P. and Kerala cross-cousin marriages are very common. Marriage with matrilateral cousins is more common in A.P. (17 %) and Kerala (10 %) than with patrilateral cousins in A.P. (13 %) and in Kerala (5 %). Acceptance of marriage alliance with other distant relatives is also seen; such marriages are rare but take place among 3 percent of families each in U.P. and A.P. and 3.6 percent of families in Kerala. Traditionally, certain degree of relationship are observed for accepting marriages with relatives all over India. The general convention is that marriage with a permissible matrilateral cousin is allowed from five degrees and on father's side seven degrees and beyond. But these traditional conditions have less sanction nowadays. In case marriages with traditionally tabooed relatives take place, which is rare for fear of social repercussions, such couples used to be excommunicated or isolated in the past. However, among the educated people, marriages with non-relatives and inter-caste marriages are increasing. Such marriages are greater in urban areas than in rural, on account of the levelling of caste barriers and modernization (table not given). Marriages with relatives or non-relatives do not show any significant fertility differences in all the three states considered in the present study.

Age at Marriage

On age at marriage, Kane(1974: 439) wrote "In the Rigveda there were no clear statements about the exact age when girls were married. But there are indications that many girls were married at a sufficiently mature age (at least they were not married at the tender age of eight)". But according to ancient Grhya and Dharma Sutras, girls were married just before the time of puberty or immediately after it. It also further elaborated that a girl is marriageable when her menstrual period is very near (menarche), i.e., one who is fit for intercourse (Kane: *Ibid*). Manu also recommended early age at marriage if a desirable bridegroom was available, Kane adds further, that, according to traditional practices, Brahmin girls were to be married between 8 to 10 years as seen from the evidence of 6th or 7th century and this practice continued on similar lines down to modern times. But brotherless girls often remained unmarried till old age in the northern parts of India. According to several ethnographic literatures available on Indian castes and tribes, early marriage including child marriage was the norm till Independence in most parts of our country except in Kerala and major metropolitan cities (Mandelbaum, 1970; Thurston & Rangachari, 1909). A glimpse of the pattern of past traditions in marriage thus reveals that early/child marriage was the norm in most communities all over India. Hence a change in this pattern noticed must be of recent origin with the advance of higher education, occupational mobility, urbanization and modernisation.

Age at marriage of girls at the national level crossed the level of child marriage (beyond 14 years) since 1970s but in many northern states, particularly in the Gangetic plains, Deccan plateau and Rajasthan, even today extensive child marriages continue, despite raising the minimum age at marriage of girls to 18 years by central legislation in 1978. According to the 1981 census, the mean ages at marriage of girls and boys are 17.8 and 22.6 only at the national level. But state-wise, significant variations on age at marriage have been noticed in different regions of India. While Kerala state has the highest age at marriage for girls and boys, U.P., Bihar, M.P., and Rajasthan states are at the lowest level. But even in Kerala, age at marriage of fishermen, the Harijans, Malabar Muslims and the tribals generally is soon after puberty. No doubt there are exceptions among them as well as among the other strata of society. In this context, in Kerala one Minister, M. P. Gangadharan, a Nayar by caste, had to resign from the cabinet of Karunakaran in 1986 because of the court strictures that he married off his daughter before she was 18, the nationally stipulated age at marriage. Of the three states that we have studied, U.P., A.P. and Kerala, showed a mean age at marriage of 18, 17.6, and 21.9 respectively for females according to 1981 census. For males also a similar trend is noticed in U.P. (21.12), A.P. (23.1) and Kerala (27.2).

Table 1 distinctly demonstrates the differences in the past age

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at marriage of wife across the three states in the three regions of India. The mean ages at marriages of these women at the time of their marriage in the past were 12.7, 14.1, and 19.0 in U.P., A.P. and Kerala respectively which would have taken place during a span of last 25 years period. These differences have to be considered in the context of the present age of women. These marriages would have taken place in a period ranging from five years to twenty years ago. Generally, puberty takes place around the age of 13 in most places in India. Of course, depending upon health and better nutritional status it may occur a year or two earlier. Under such circumstances most of the marriages in U.P. (61.5 %), slightly more than one-third of the marriages in A.P. (38 %) and negligible in Kerala (2.3 %) must have taken place either around the puberty time or a little prior to it (≤13 years). In fact, they were all child marriages. When we consider the earliest marriage up to the age of 11 years or less, significantly more persons in U.P. (35%) and only a less percent in A.P. (12.6%) ($z = 16.63$, $p = 0.01$) and a negligible percent in Kerala (0.08%) married prior to puberty. These findings clearly reveal the wide prevalence of child marriage in U.P. and the trend remains more or less the same even now in this state. The situation in A.P. and Kerala is encouraging because of the lowest rate of child marriage, not only now, but even in the recent past. Considering marriages in the past in the light of the present legal age at marriage of girls, it is interesting to see that only in Kerala (71%) nearly two-thirds of the marriages were held on or after 18 years of age but in U.P. (3.8%) and A.P. (7%) only a negligible number of marriages took place at the age of 18 or beyond. Since age at marriage changes very slowly and the parents have the final say in this matter, their children can be motivated to marry late only if their parents change their attitude in favour of higher age at marriage. In all the states put together also, only one-third of the marriages (33%) really occurred at 18 years and thereafter.

Regarding the marriages of boys in the past, a quarter of them in U.P. married at young ages of 14 years and below, whereas only a negligible percent of child marriages among them took place in A.P. (2%) and almost all nil in Kerala (0.1%). The mean age at marriage of these men at the time of their marriage during the last 30-35 years was 17.4, 20.9, 25.9 in U.P., A.P., and Kerala respectively. When marriages of the past are examined in the light of the present permissible age at marriage, i.e., 21 years or more, an overwhelming number of marriages (80%) in U.P., slightly more than one-third of them in A.P. (37%) and a negligible number of marriages in Kerala (2%) took place at any ages prior to 21 years. Only a negligible percentage of men married at 25 years or more in U.P. (3%), one tenth cases in A.P. (12%) and an overwhelming number of men in Kerala (61%). In all the states together, however, only 28 percent of men married at 25 years and above. This trend may not be very different from what we see according to the 1981 census. The implication is that for the future fertilty reduction, the age at marriage of boys has to be increased to 25 or more and girls to 20 or more to create a substantial fertility decline and to reduce neonatal mortality to the minimum.

Table 1: *Percent Distribution of Respondents in U.P., A.P. and Keralá by Age at Marriage of Wife*

Age at marriage of wife	U.P	A.P	Kerala	Total
≤ 9 years	14.8	3.1	0.04	5.5
	(295)	(61)	(1)	(357)
10 - 11 years	19.8	9.5	0.04	9.0
	(395)	(190)	(1)	(586)
12 - 13 years	27.1	25.8	1.5	16.9
	(542)	(516)	(37)	(1095)
14 - 15 years	25.6	37.6	7.6	22.4
	(512)	(752)	(191)	(1455)
16 - 17 years	9.1	16.9	19.4	15.4
	(182)	(339)	(486)	(1007)
18 - 19 years	2.9	4.9	31.2	14.4
	(57)	(99)	(779)	(935)
20 + years	0.9	2.2	40.2	16.4
	(17)	(43)	(1005)	(1065)

Age at Marriage and Fertility

Age at marriage by and large reveals a definite negative association with fertility independently, in all the states separately and all the states together. When the relationship of age at marriage with fertility is examined, controlling the duration of marriage of wives, the same trend more or less prevails among the young, middle-aged and older persons in A.P. and Kerala but not in U.P.

Determinants of Late Marriage of Daughters

Determinants of late marriage are not widely reported trom U.P. and A.P. states but a tenth of the respondents from Kerala have given several specific reasons for them. From U.P. not even one percent of the respondents agreed with any of the listed reasons for late marriage, but from A.P. to percent of the respondents gave certain reasons for late marriage in the past. The report confirms that late marriages of girls are widely prevalent only in Kerala and they are negligible in U.P and A.P. states. In Kerala the marriages of 14.4 percent of the respondents, who form the single largest group, were delayed because the required amount of dowry could not be raised on time. For another 11 percent, marriage was delayed because a suitable bridegroom was not readily available. All other reasons, which were reported by only less than ten per cent of the respondents, include incompatability of horoscope, completion of education, looking for jobs, to develop ability to adjust with husband, absence of parents, family burden and financial difficulty, dislike of marriage and temporary ill-health. Certain other factors including some of these items were identified in another study in Kerala by this author (Mahadevan, K. and Sumangala, 1987).[2] They are as follows: "waiting for clearance in the marriage line of uncle, elder brothers and sisters; not prepared to shoulder family responsibility at a young age; financial difficulties, waiting to get a job at the right age; did not find a suitable alliance in right time; horoscope did not match, interest in marriage was lacking; wanted a planned and independent married life; could not afford to marry with a low paid job at present." Most of these factors are economical and the rest are situational and cultural in nature. In another recent study in Kerala, Zachariah (1983:133)[3] also identified a number of reasons for the late marriage of women. They are: economic security, expecting a job, waiting to complete education, no desire to get married too young, waiting for sisters to get married and family obligations. These factors can be made use of for developing a new policy to increase age at marriage of girls and boys and for strengthening population education on at marriage.

The Gauna in U.P.

In U.P. alone, after marriage the bride and bridegroom are not allowed to live together for a specified period and they begin their sexual relations only at a certain auspicious time fixed by elders. This custom is called the Gauna. When the girl and boy are married at young ages, which is very common in U.P. the period of Gauna will be prolonged. Among Brahmins in several parts of India, Gauna of a short duration is followed which culminates in an auspicious sexual union termed as the "Shantimuhurtam". An astrologically suitable time is considered for the first sexual union so that the first child may be born in a good month and under an auspicious star. It is believed that certain months in a year are inauspicious for delivery and the children born during that period may not be lucky and so on. Though this Gauna custom was widely prevalent in the Gangetic belt of northern India, it has become a rare phenomenon even there among the non-Brahmins. Only 12 percent of U.P. respondents had waited for 1 to 6 years to begin their first sexual union after the formal marriage (table not given). Most of them would have married around their 10th year and therefore,waiting for a few years until after the puberty of the bride is understandable. Among these couples who observed the Gauna, 4.7 percent waited only for a year and the rest (7.85) waited for 5 to 6 years. No such Gauna was reported either from A.P. or Kerala. If Gauna can be re-enforced in U.P. for a period of 5 years for the girls who marry between their 13th year and 17th year, this custom may be helpful in delaying the onset of procreation and in turn in reducing fertility. Certain incentives can be provided for this purpose. Since it is a socially accepted custom, and certain parents object to the raising of age at marriage, this arrangement may be practicable in U.P., Bihar and M.P. where this custom prevails.

Value of Brothers in Fixing Marriages

In most parts of India, the bridegroom's side gives importance to a bride who has one or more brothers. It has been so from the remote past. It is not clearly known why such importance is attached to it, except that the brother of a bride has to perform certain functions at the time of marriage. One such is that he has to receive the bridegroom into the marriage pandal after washing the feet of the bridegroom. It may be the absence of a brother might lead to difficulty in performing such conventional and essential customs. It may also be regarded as inauspicious according to custom.

From U.P. and A.P. 86.5 percent of the respondents respectively consider it important to select a bride with a brother, but in Kerala only 68.3 percent of them give importance to this criterion. When it was asked as to whether they would accept a bride who did not have a brother, 55 percent and 68 percent respondents in U.P. and A.P. respectively replied negatively, but only 10 percent of the people in Kerala replied similarly. Hence this factor is more important in A.P. and U.P. than it is in Kerala.

Table 1.3: **Percent Distribution – Reasons for Late Marriage of Daughters in U.P., A.P., Kerala and India*

Reasons	U.P.	A.P.	Kerala	India
1. Horoscope not matching	0.2	0.3	7.0	2.7 (173)
2. Suitable alliance was not available	0.9	2.0	11.0	5.0 (313)
3. Dowry could not be raised	0.4	1.1	14.4	6.0 (389)
4. Waited for completion of education	0.3	2.0	8.0	4.0 (237)
5. Waited for job	-	0.6	6.0	2.3 (150)
6. Adjustment with husband	0.1	0.1	1.2	0.5 (32)

*Specific reasons reported by the respondents alone are computed here.

Demographically, this factor may delay the age at marriage of a bride who has no brother(s) till she gets an alliance from a party which does not believe in this factor. On the other hand, it has a pronatalist influence also. Suppose a couple continues to get girls only for the first three of four parties, the parents may not limit the family size to a few children and may go in for a big family till a boy is obtained, so that, finding marriage alliances for the daughters may be made easier. In other words, this factor also reveals a new cultural dimension regarding the value of children, and it has not been identified, so far, in any of the earlier studies (see Table 1.4).

Cost of Marriage Expenses

For arranging marriages of girls several items of expenditure are involved. The major items are dowry in the form of cash, ornaments, provision of facilities and feasts, gifts, including furniture, vessels, vehicle, clothes, landed property and a house. Of these landed property and house are not given for immediate use but for later use. All other items have to be given by the parents of the bride prior to or during the marriage. Though dowry was declared illegal by the government in 1961, it continues unabated all over India irrespective of religious, caste, and regional variations. Of course, the amount of cash or gold given varies significantly according to the status of the bride and groom in terms of their income, education, caste and religion. It has not been easy to gather enough data on marriage expenses because rich people may report less and poor and middle class also report more about the cost involved in the marriage for fear of income tax and for status reasons respectively. Nevertheless, we got an approximate picture of the range of expenditure which is, no doubt, useful to understand the magnitude of this problem and its differences across the different sections of the population.

Table 1.4: *Percent Distribution of Respondents in U.P., A.P., Kerala and India by Importance of Marriage Alliance with Bride who have Brothers*

Importance of marriage alliance with bride who have brothers	U.P.	A.P.	Kerala	India
Important	86.5	85.3	68.3	79.1 (5143)
Not important	13.6	12.9	31.7	20.3 (1320)
No idea	-	1.9	-	0.5 (37)
Total	100.0 (2000)	100.0 (2000)	100.0 (2500)	100.0 (6500)

The total expenditure on various items of marriage was significantly higher for a greater percentage of people in Kerala. Andhra Pradesh comes next and U.P. last in this regard. While 74 percent of the people in Kerala spent over Rs. 10,000 for meeting the entire cost of a marriage, only 27 percent and 22 percent of people in A.P. and U.P. respectively spent a similar amount. A break-up of the costs may be interesting. In Kerala 13 percent of people spent over Rs. 50,000 in contrast to 5.5 percent and 0.3 percent of people spending so much in A.P. and U.P. respectively. In other words, the total expenditure for marriage for an overwhelming percentage of people in U.P. (78%) and A.P. (73%) is much less and is in the order of Rs. 10,000 or less but in Kerala only a quarter of the population spent such a low amount on marriage (see Table 1.5).

Item-wise expenditure on marriage also shows similar trend in differential cost of marriage. Dowry in the form of cash, and cost of ornaments constitute the lion's share of the cost of marriage. In both these items Kerala leads the other two states. Other items of marriage are subject to several factors and fluctuations and therefore cannot be compared here. Another observation to be made is that people in all the three areas under-state the cost of individual items but when they state the total expenditure of marriage they seem to be more accurate. This means that either they do not maintain a proper record of item-wise expenditure or have inhibitions against reporting less fearing that they may be exposing their sons-in-law and their family to the scrutiny of strangers.

Demographically, the cost of dowry has three major implications. First of all, increased expected expenditure on marriage may influence the parents or sections of people for whom marriage expenses are a major factor to limit the family size for fear of not being able to meet the cost of the marriage of their children at a later date. A second implication is that it delays marriage very much for the same group of families, who have to pay dowry to the bridegroom. Kerala's higher age at marriage has been significantly correlated with the higher rate of dowry prevailing. This fact has been confirmed in a recent study by Zachariah (1983). In another recent study of this author (Mahadevan & Sumangala, 1987) has identified several demographic implications of the higher rate of dowry in Kerala. First of all it has raised age at marriage of both girls and boys. Subsequently, married persons limit the family to one or two children, fearing the future payment of dowry and several other marriage expenses. Thirdly, the increased cost of marriage has promoted fraternal polyandry, a custom that had almost disappeared in Kerala several decades ago. In addition to these demographic implications, it is associated with corruption. People who have several daughters and children may be tempted to indulge in dishonest ways of making money to meet the future marriage expenses of their children and also of other dependents. Because of the evil effect of dowry or non-payment of dowry after marriage, several daughters-in-law suffer at the hands of their in-laws. Several homicides and suicides have been taking place on account of the dowry problem, particularly in U.P. and the northern parts of India. Parents and girls are subject to great mental tension, when they fail to arrange a marriage on account of dowry. Considering the deleterious effect of dowry on society, stringent laws have to be evolved and enacted to check this menace. In addition, several incentives and reforms have to be introduced among people and educate them to minimise the obnoxious effects of this social evil for the wellbeing of families.

Table 1.5: *Percent Distribution of Respondents in U.P., A.P., Kerala and India by Total Expenditure for Daughters Marriage*

Total expenditure for daughters marriage Rs.	U.P.	A.P.	Kerala	India
1. Rs. ≤ 10,000	78.3	73.4	25.7	47.7 (562)
2. 10,001-30,000	18.5	17.1	45.6	33.6 (396)
3. 30,001-50,000	2.9	4.0	15.5	10.2 (120)
4. 50,001 +	0.3	5.5	13.2	8.5 (100)

Marriageable Boys and Girls

Among the total families studied, the proportion of marriageable boys and girls available in the three states varies in all the categories of age groups. Presence of unmarried boys are higher up to the ages of 29 or less in these states. In 7.2 percent families in U.P., 15.8 percent in A.P. and 22.9 percent in Kerala have marriageable boys according to the socially permissible ages. At the aggregate level 15.9 percent families have similar boys. However, in the light of the existing legally permissible age at marriage of boys (21 years and above) only 2.9 percent families in U.P., 5.7 percent in A.P. and 14.4 percent in Kerala and 8.1 percent at the aggregate level have potential bridegrooms (see Table 1.6).

Regarding unmarried girls only 7 percent families in U.P., 14 percent in A.P. and 19.5 percent in Kerala have got potential but legally not permissible brides. Among them, however, legally permissible marriageable girls are available only in 1 percent of families in U.P., 4.8 percent in A.P. and 14.1 percent houses in Kerala. These findings reveal that in U.P. very negligible girls remain unmarried beyond the 18 years of age but their percent is significantly more in A.P. than in U.P. and similarly in Kerala compared to A.P. and U.P. states.

Table 1.6: *Percent Distribution of Unmarried Boys and Girls in the Families of U.P., A.P., Kerala and India*

Age		U.P. N = 2000	A.P. N = 2000	Kerala N = 2500	India N = 6500
Boys:					
	18 - 20	4.8	10.4	9.8	8.5
		(96)	(208)	(246)	(550)
	21 - 29	2.4	5.4	13.1	7.4
		(48)	(108)	(327)	(483)
	30 +	.45	.30	1.3	.73
		(9)	(6)	(33)	(48)
Girls:					
	13 - 17	7.0	14.0	19.5	13.9
		(140)	(279)	(487)	(906)
	18 - 24	.9	4.6	11.9	6.3
		(18)	(92)	(298)	(408)
	25 +	0.05	0.25	2.2	0.92
		(1)	(5)	(54)	(60)

Dissolution of Marriage

Availability of widows, widowers, divorced, and separated persons significantly vary among families of the three states. Widows are seen more in Kerala (18.2%) and A.P. (17%) than in U.P. (11.5%). At the aggregate level 15.7 percent of families had widows. The separated and divorced cases are relatively more in Kerala (1.8%) than in A.P. (1%) and U.P. (0.1%) and at the aggregate level also they are very less (1%). Regarding widowers a reverse trend is seen among these states; they are almost double in

U.P. (5.9%) than in Kerala (2.8%) but A.P. (3.3%) at an intermediate level. This trend is seen in U.P. because of the higher incidence of maternal mortality resulting from neglect of women, risk involved during delivery time and so on. Such situations are negligible in Kerala and also rare in A.P. Divorced and separated men are also negligible and they do not differ much across these states because men can divorce women and the vice versa is unimaginable in the traditional Indian context. Any women venturing on such an act will be looked down upon in most parts of our country (see Table 1.7).

Table 1.7: *Percent distribution of marital dissolution in terms of widows, separated, divorced (female) widowers, divorced / separated (men) in the families of U.P., A.P., Kerala and India*

	U.P. (N = 2000)	A.P. (N = 2000)	Kerala (N = 2500)	India (N = 6500)
Widows	11.5	17.0	18.2	15.7
	(229)	(340)	(454)	(1023)
Separated and divorced (female)	0.05	1.0	1.8	0.98
	(1)	(19)	(44)	(64)
Widowers	5.9	3.3	2.8	3.9
	(118)	(65)	(69)	(252)
Divorced and separated (men)	0.1	0.25	0.16	0.17
	(2)	(5)	(4)	(11)

REFERENCES

1 Mahadevan, K. & P. R. Dutt, 1972. "Sociological appraisal on raising age at marriage", Bulletin,GIRH & FP, Vol. VI.

2 Mahadevan, K. and Sumangala, M., 1987: Social development, cultural change and fertility decline: Study of Kerala, New Delhi, Sage.

3 Zachariah, K.C., 1983: Anomaly of the Fertility Decline in Kerala. Report No.1 from PRO 671-90, World Bank.

2

Fertility and Other Demographic Variables

– K. Mahadevan & R. Jayasree

FERTILITY DIFFERENTIALS

The birth rates among the states of U. P., A. P. and Kerala which have been studied during the reference period of June 1983 to May 1984, differ significantly. The crude birth rate in U.P. is the highest (34.5) followed by A.P. (31.8), and it is lowest in Kerala (26.8). Taking the birth rates of the three states together, the pooled birth rates for India is 31.1. Similarly the average number of children born to couples in all the three states is remarkably different. The average number of live births for the states of U.P., A.P. and Kerala are 5.2, 4.2 and 3.3 respectively, and the pooled number for India is 4.1. These rates are based on the eligible couples who have one or more live birhts.

The differential fertility in 7 districts, viz., Gorakhpur and Jhansi in U.P., Kurnool and Guntur in A.P., Palghat, Alleppey and Trivandrum in Kerala, is observed on a significant level between the districts, within the states and/or among the states. The crude birth rates between Gorakhpur and Jhansi in U.P. however, do not greatly differ and also their total fertility rates. Nevertheless, the birth rate in Jhansi (35.2), is slightly higher than that of Gorakhpur (34.0). In A.P. birth rate in the Kurnool district (38.4) is higher than that of the Guntur district (24.3). There are several cultural and developmental differences between Kurnool and Guntur while it may account for the fertility differences between them. The Kurnool district has a greater concentration of Muslim population in the study area and that may be a factor for its high fertility. Further, the Guntur district is one of the economically developed districts in A.P., while Kurnool is a backward district. Of the three districts in Kerala, Palghat (29.2) and Alleppey (29.4) reveal similar levels of birth rate, which is significantly higher than the birth rate of Trivandrum district (24.6). Trivandrum district has a very high level of urbanisation. The capital of the state is situated in this district. Because it has greater facilities of communication, transport, health, etc., compared to Alleppey and Palghat, it can be considered that Trivandrum district manifests the lowest fertility because of these factors. Taking into consideration the above mentioned 7 districts from the three states, it can be seen that the birth rate is over 30 in Kurnool (38.4), Jhansi (35.2) and Gorakhpur (34.0) while in the rest of the district, viz., Alleppey (29.4), Palghat (29.2); Trivandrum (24.6), and Guntur (24.3) it is below 30. Though as a state, U.P. has the highest fertility and Kerala has the lowest fertility, the district-wise figures show that the Guntur in A.P. and Trivandrum in Kerala have the lowest and Kurnool in A.P. has the highest fertility. These findings reveal the necessity of giving priorirty to higher fertility districts and ecological regions in locating area projects and providing greater inputs. Added to this, there is the need to take up fertility studies on similar lines in the remaining districts in the country for generating data for better planning. Comparing the present findings with those of the R.G's data of 1982, a similar trend of high fertility in U.P. low fertility in Kerala and an intermediate level in Andhra Pradesh are noticed. There is a higher decline of birth rate in U.P. but it is stationary in A.P. and Kerala between these two study periods. While considering the total fertility rate as another measure of fertility, a similar trend is observed.

Age Specific Fertility Rates

The pattern of age-specific fertility rate across the states of U.P., A.P. and Kerala shows remarkably varying patterns. While in U.P. the reproductive span is more or less maintained at a high level right from the age of 15 to 39 years, in A.P. it extends from 15 to 34 years and in Kerala from 20 to 34 years. These figures reveal that U.P. has the longest duration of high fertility reproductive span followed by A.P. The shortest duration is in Kerala. The commencement of fertility at young ages of 15-19 is very low (i.e., ASFR 13) in Kerala and high in U.P. (i.e., ASFR 92). The highest fertility of A.P. at the young age is contrary to the general belief because the U.P. state is expected to have the highest fertility for this age group. The peak age group of reproduction, however, is fairly common to all the three states, i.e., from 20 to 24 years (i.e., 250 in Kerala, 288 in A.P. and 293 in U.P.) and thereafter fertility tapers down. This tapering down is very steep from 30 to 34 years in Kerala and A.P. but it is beyond 39 years in Uttar Pradesh.

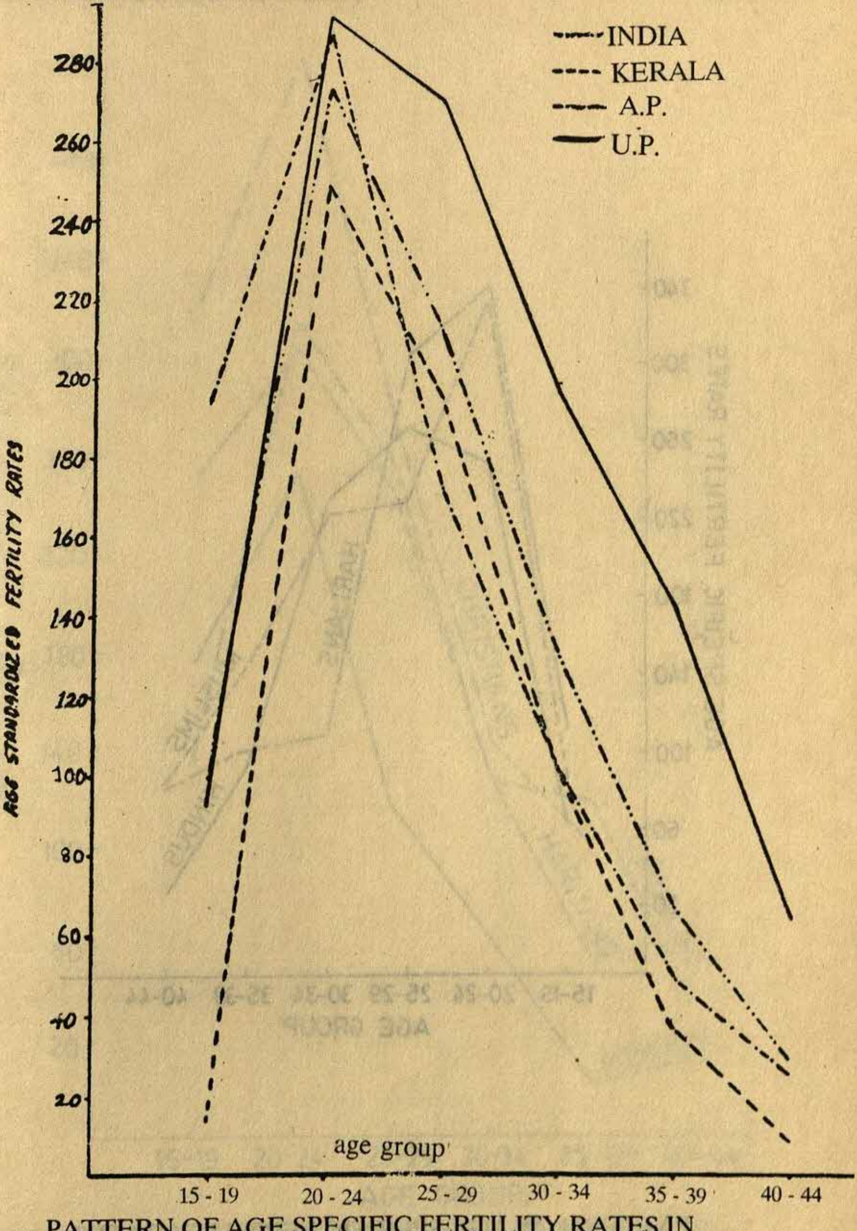
Table 2: *Crude Birth Rates and Total Fertility Rates (average live births) for India, U.P., A.P. and Kerala*

Country/State District	CBR (Standardised) (Present study)	TFR	CBR* (1982 Rural)
India (Pooled)	31.1	4.1	35.5
U.P.	34.5	5.2	39.9
A.P.	31.8	4.2	32.0
Kerala	26.8	3.3	26.4
Districts			
Gorakhpur	34.0	5.1	NA
Jhansi	35.2	5.3	NA
Kurnool	38.4	5.1	NA
Guntur	24.3	3.1	NA
Palghat	29.2	3.3	NA
Alleppey	29.4	3.1	NA
Trivandrum	24.6	2.8	NA

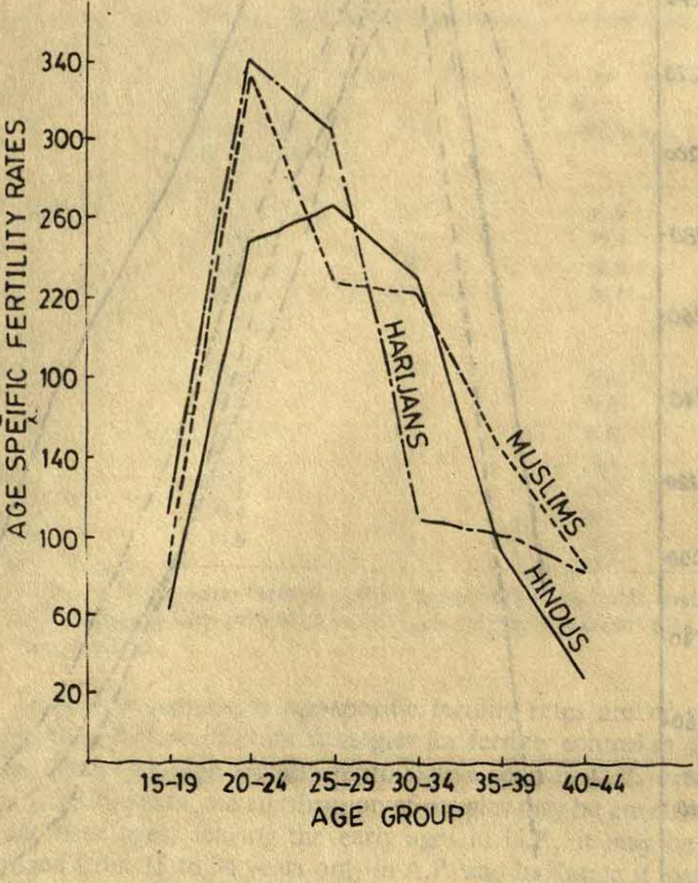
*Office of the Registrar General of India, Survey Report on levels, trnds and differntials in fertility, 1979. Ministry of Home Affairs, New Delhi - SRS.

NA –Not Available.

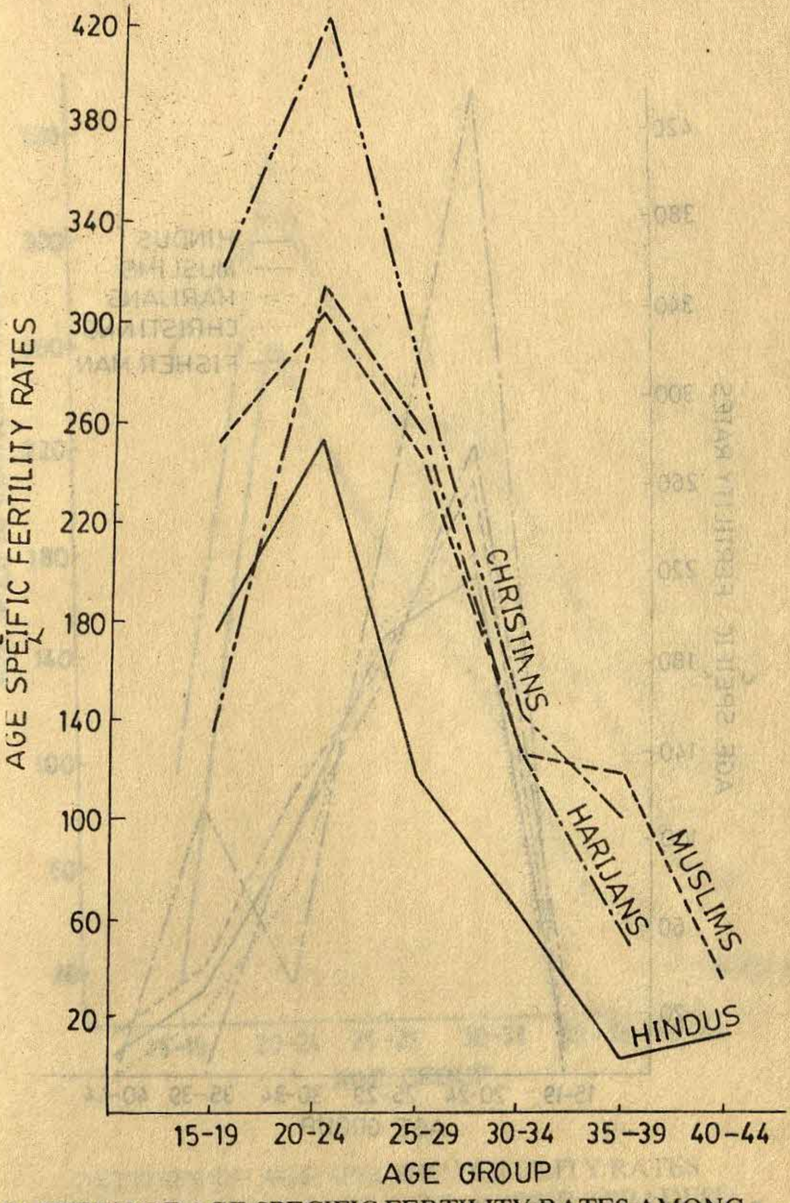
These differentials in age-specific fertility rates are of great relevance to follow different strategies for fertility control in these states. Since the high fertility reproductive span in U.P. extends from 15 to 39 years, the sterilization of couples may be encouraged for all these ages, leaving the early ages in U.P., it may be encouraged from 15 to 34 years only in A.P. and in Kerala it may be considered from 20 to 34 years barring the first few years. Sterilization done among these respective age groups will be demographically effective. Hence from the present findings, it is possible to lay differential emphasis in different states in reducing the ASFR so as to lead to a demographically effective policy (see the graph) based on the peak periods of their reproduction.



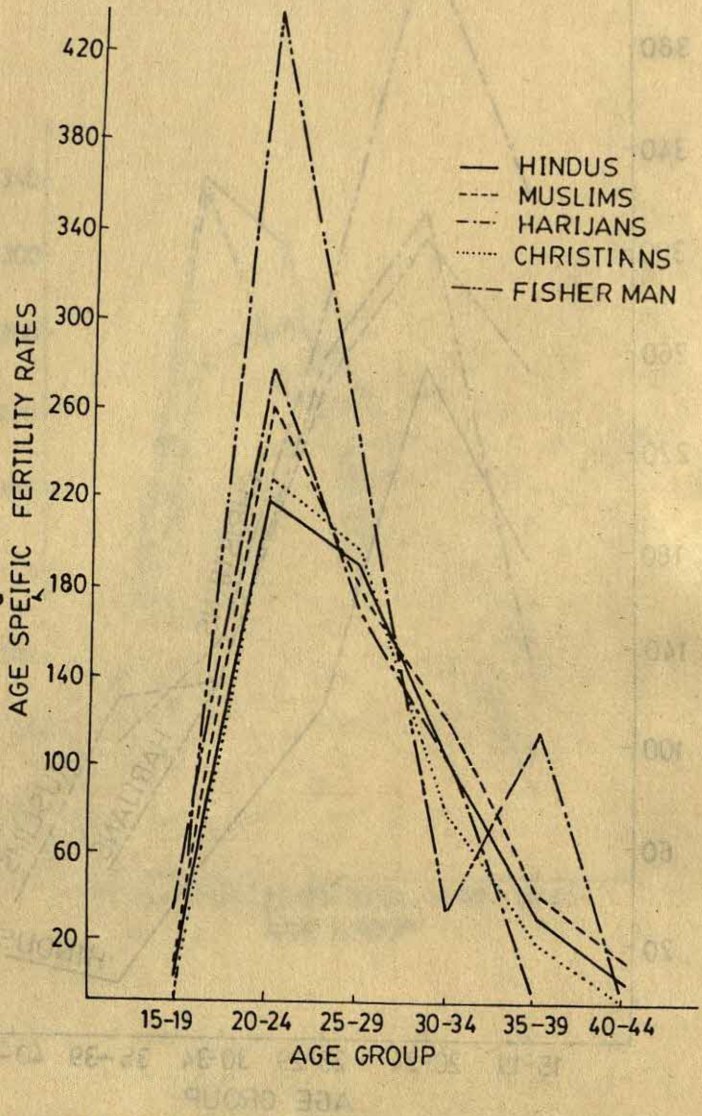
PATTERN OF AGE SPECIFIC FERTILITY RATES IN KERALA ANDHRA PRADESH, UTTAR PRADESH & INDIA



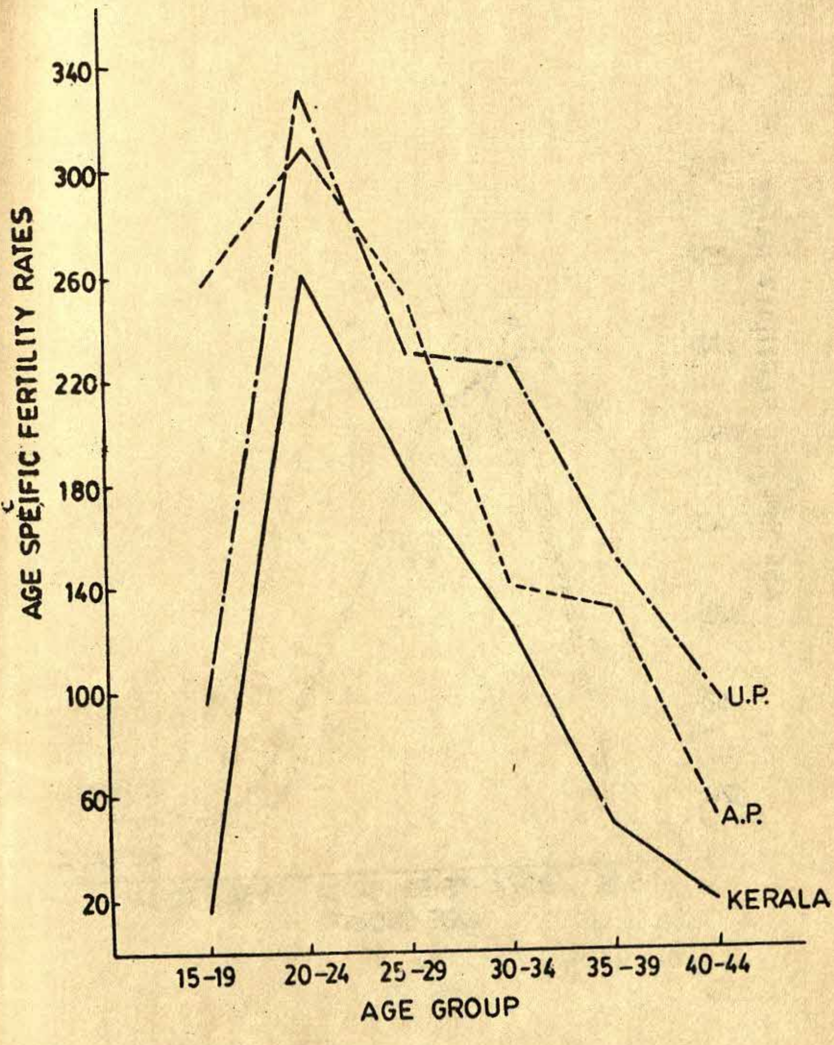
PATTERN OF AGE SPECIFIC FERTILITY RATES AMONG VARIOUS COMMUNITIES IN UTTAR PRADESH



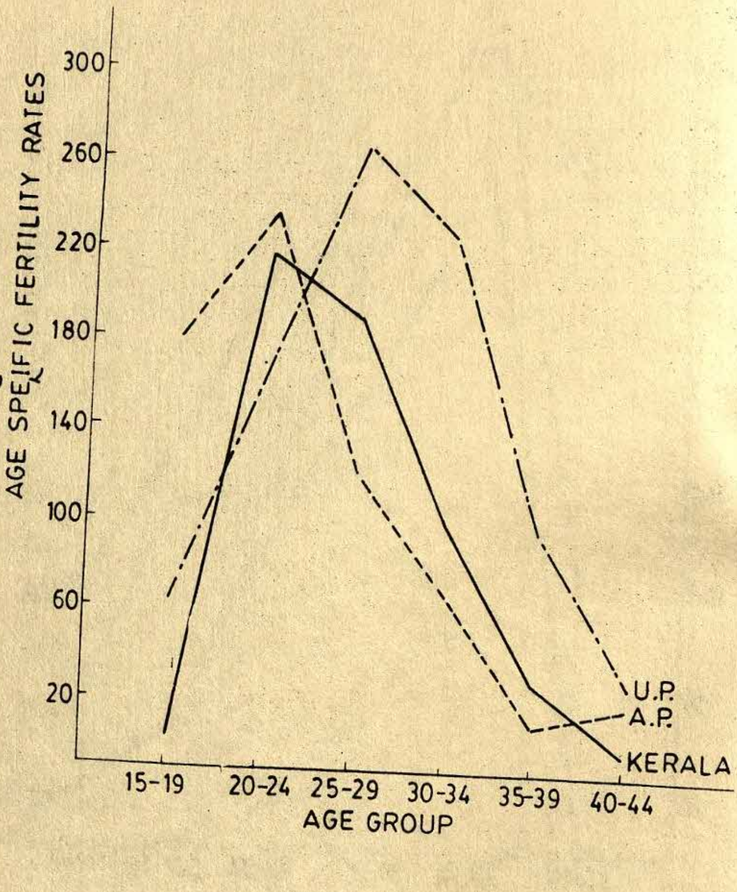
PATTERN OF AGE SPECIFIC FERTILITY RATES AMONG VARIOUS COMMUNITIES IN ANDHRA PRADESH



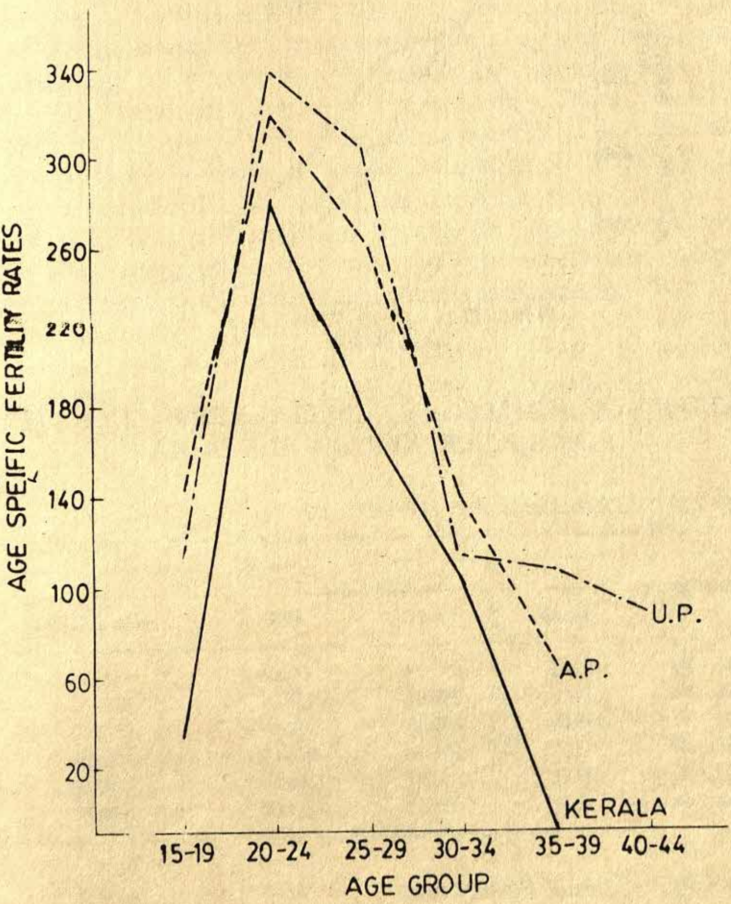
PATTERN OF AGE SPECIFIC FERTILITY RATES AMONG VARIOUS COMMUNITIES IN KERALA STATE



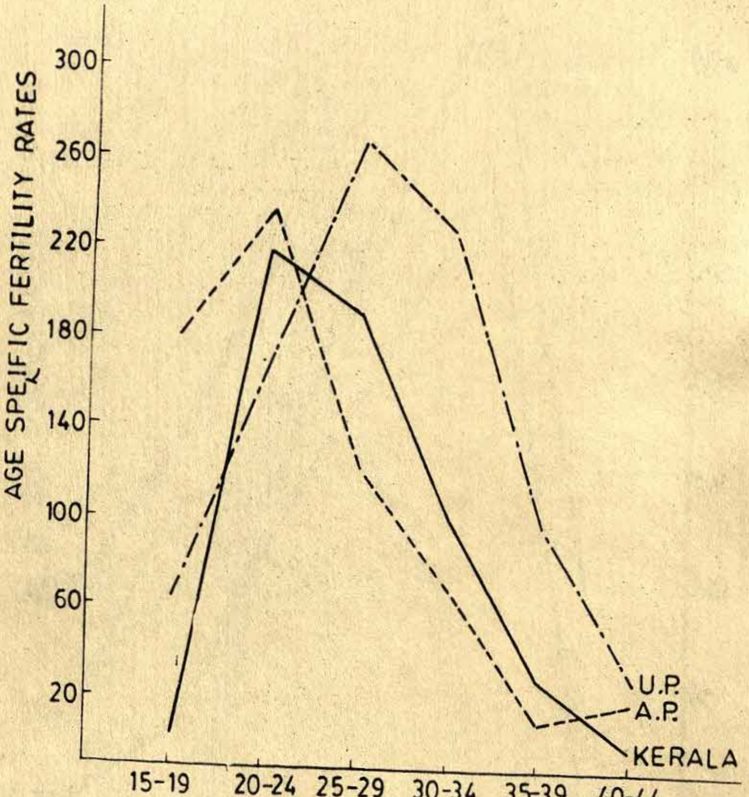
PATTERN OF AGE SPECIFIC FERTILITY RATES AMONG MUSLIMS OF KERALA, ANDHRA PRADESH & UTTAR PRADESH



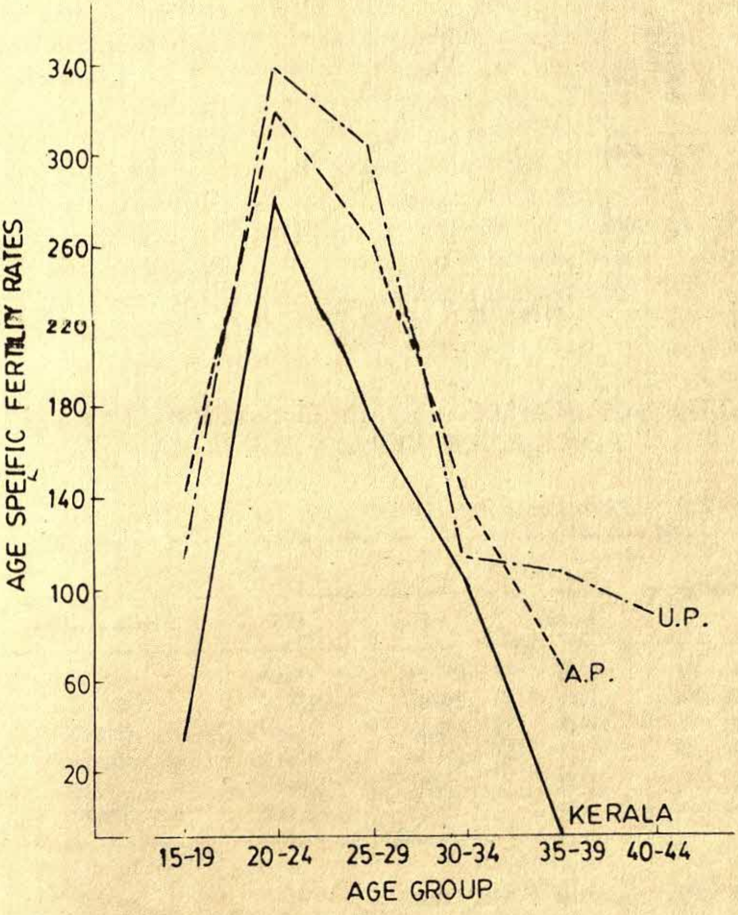
AGE SPECIFIC FERTILITY RATES AMONG HINDUS OF KERALA, ANDHRA PRADESH & UTTAR PRADESH



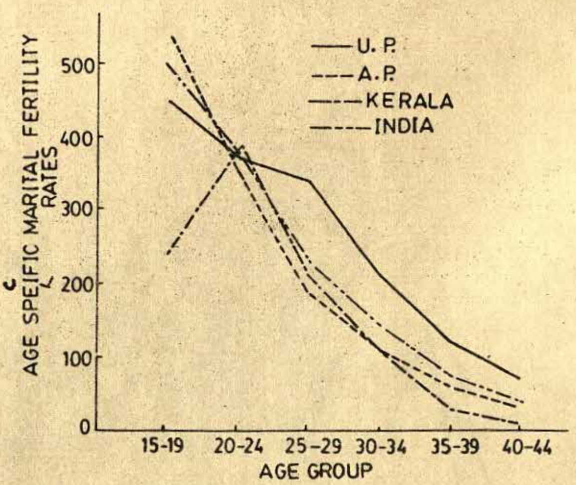
PATTERN OF AGE SPECIFIC FERTILITY RATES
AMONG HARIJANS OF KERALA,
ANDHRA PRADESH AND UTTAR PRADESH



AGE SPECIFIC FERTILITY RATES AMONG HINDUS OF KERALA, ANDHRA PRADESH & UTTAR PRADESH



PATTERN OF AGE SPECIFIC FERTILITY RATES
AMONG HARIJANS OF KERALA,
ANDHRA PRADESH AND UTTAR PRADESH



PATTERN OF AGE SPECIFIC MARITAL FERTILITY RATES FOR U.P., A.P., KERALA AND INDIA

Table 2.1: *ASFR for Kerala, A.P., U.P. and India*

Age group	ASFR			
	Kerala	A.P.	U.P.	India (Pooled)
15 - 19	13.45	195.73	92.38	99.76
20 - 24	250.00	288.01	292.54	274.62
25 - 29	196.03	173.83	271.56	212.62
30 - 34	103.57	101.04	198.11	132.85
35 - 39	37.36	50.51	144.50	69.00
40 - 44	8.33	25.51	65.64	30.67

Age-Specific Marital Fertility Rates

The age-specific marital fertility rates also significantly vary for the different age cohorts across these three states. Similarly total marital fertility rates also differ among them; it is 7.5 in U.P. followed by 6.4 in A.P. and 4.9 in Kerala and at the aggregate level 6.7. The highest level of age-specific marital fertility is manifested in U.P. (450) and A.P. (540) for the age groups ranging from 15-19 years; surprisingly for this youngest age group fertility is significantly more in A.P. than in U.P. However, a similar level of fertility in Kerala is not there for the youngest cohorts but it is seen for the age group from 20-24. Such a peak trend in fertility of different age cohorts in U.P. and A.P. on the one side and Kerala on the other is because of their differential age at marriage. Though age-specific marital fertility rates steadily decline with the advancement of age, they continue to be high in U.P. up to the age of 39 and in A.P. and Kerala up to the age of 34 only. Therefore, A.P. is similar to U.P. with regard to the commencement of peak period in fertility. But it is similar to Kerala in tapering off of the high fertility period. For India more or less the A.P's age-specific marital fertility rates is noticed. These findings provide differential clues for giving emphasis and priority to promote family planning programmes among different age cohorts in these states. While the family planning programme may have to give more or less equal importance for the women aged 15-39 years in U.P., the same may be extended to A.P. from 15-34 age cohorts and Kerala 20-34 in view of their differential peak periods noticed in fertility behaviour.

Table 2.2

Age Intervals	Number of Births	Number of Women	ASMFR
	ASMFR: U.P.		
15 - 19	40	87	450
20 - 24	153	406	370
25 - 29	148	498	290
30 - 34	84	395	210
35 - 39	45	375	120
40 - 44	17	224	70
TMFR = 7.5			
	ASMFR: A.P.		
15 - 19	117	213	540
20 - 24	160	449	350
25 - 29	95	497	190
30 - 34	40	358	110
35 - 39	17	280	60
40 - 44	5	154	32
TMFR: 6.4			

ASMFR: Kerala

15 - 19	9	37	240
20 - 24	161	412	390
25 - 29	158	749	210
30 - 34	58	517	110
35 - 39	17	432	30
40 - 44	3	296	10

TMFR = 4.9

ASMFR: India

15 - 19	166	337	493
20 - 24	474	1267	374
25 - 29	401	1744	230
30 - 34	182	1270	143
35 - 39	79	1087	73
40 - 44	25	674	37

TMFR = 6.7

Family Size Norm

Fertility varied significantly across the states of U.P., A.P. and Kerala (see Table 2.3). It is true with regard to the crude birth rate and total fertility rate. Table Nos. 2, 2.1 and 2.2 further provides the data on the continuing trend in the age specific fertility behaviour of these three states. In addition to these measures of fertility behaviour, the maximum and additional expected family size norms would enable us to predict the probable future fertility more or less accurately because the respondents give an idea about their future fertility normally keeping in view the preference for son(s) and risk of infant and childhood mortality. Such considerations would not be there, when we project the future fertility through other methods. Under such circumstances it is very important to note particularly that the low parity couples in U.P., A.P. and Kerala are for an additional number of 1.6, 1.4, and 1.1 children respectively in the near future. The future additional requirements of children alone in U.P. and A.P. almost amount to the national norm of a small family of 1 to 2 children. this additional requirement is over and above their present total fertility rate.

Even Kerala's additional expected number of children of 1.1 would cross the nationally recommended small family norm. These valuable findings provide enough clues for the policy makers to intensify the concept of small family norm differentially and with varying degrees of emphasis among all the states in India based on their present additional expected family size norm or maximum expected family size norm. Such efforts would have to be integrated with manipulable strategies to ensure the survival chances of the existing children and replace the conventional major determinants of high fertility with suitable government-sponsored social security programmes to bear fruit in a short period of time. The impact of small family norm seems to have made considerable headway in Kerala and A.P. but not in U.P., when we compare their mean live births with that of their maximum expected family size norm. In these states, people have given birth to more children than they really want – TFR 5.2 in U.P., 4.2 and 3.3 in A.P. and Kerala respectively. The maximum expected number of children in these states is 5.1, 3.5 and 2.9 respectively. The differences between TFR and maximum expected family size norm in these states are 0.1. 0.7 and 0.4 in U.P., A.P. and Kerala respectively. This means that, except for U.P., people have really understood the folly of giving birth to more children and the concept of small family norm has taken root, with the impact of National Family Planning Programmes and other concomitant social changes. The unwanted children reflected in these differences are more in A. P. than in Kerala because the former has significantly a higher TFR than the Kerala state. All these valuable findings provide us clues to intensify the education and other efforts in states like U.P., where the programme has not made any impact in behavioural terms.

Table 2.3: *Family Size Norm in U.P., A.P. and Kerala states*

Family size norm	U.P.	A.P.	Kerala
1. TFR	5.2	4.2	3.3
2. Maximum number of children desired	5.1	3.5	2.9
3. Additional children desired	1.6	1.4	1.1

Sex-Ratio for U.P., A.P., Kerala and India

The sex ratio is defined as number of females per 1,000 males. For India, sex ratio is 953 when the data is pooled. Sex ratio is the highest for Kerala (1,040) followed by A.P. (948) and U.P. (871). More or less a similar pattern was observed in 1981 census.

Table 2.4: *Sex Ratio in U.P., A.P., Kerala and India*

Country/States	Sex ratio (Present study)	Sex ratio (1981 census)*
India	953 **	933
U.P.	871	879
A.P.	948	977
Kerala	1040	1032

* Family Planning Year Book 1982-83.
** Based on three states.

Kerala has the highest sex ratio in the country due to lower female mortality and a greater male out-migration. Better health facilities, absence of female infanticide, better social status of women, changes in the value of children, better educational facilities, high mean age at marriage for females, etc., are the other associated factors. The sex ratio is in favour of males in U.P. and A.P., lack of health facilities, high female mortality, incidence of female infanticide, low educational facilities, child marriage, etc., can be cited here as probable explanations.

Age, Duration of Married Life and Fertility

The age of wife and husband in all the three states is more or less similar with only minor differences. The mean ages of wives in the U.P., A.P. and Kerala are 30, 29 and 31 respectively and those of their husbands 35, 35 and 38 respectively. Wives and husbands in Kerala are slightly older by one and three years respectively as compared to the U.P. state. Such differences, of course, would not make any significant fertility difference between the women of these states. However, grouping of women by broad age categories into ≤24, 25-34 and 35+ shows significant differences among these three states. While 33 percent of them in A.P. belong to the young age group of ≤24, only 25 percent in U.P. and 18 percent in Kerala belong to the same age category. Further, the subsequent high fertile group of women belonging to the ages of 25-34 are significantly more in Kerala (50%); and they are almost equal in U.P. (45%) and A.P. (43%) states. Regarding the older age group of women, not much difference is noticed across U.P. (31%), A.P. (25%) and Kerala (32%).

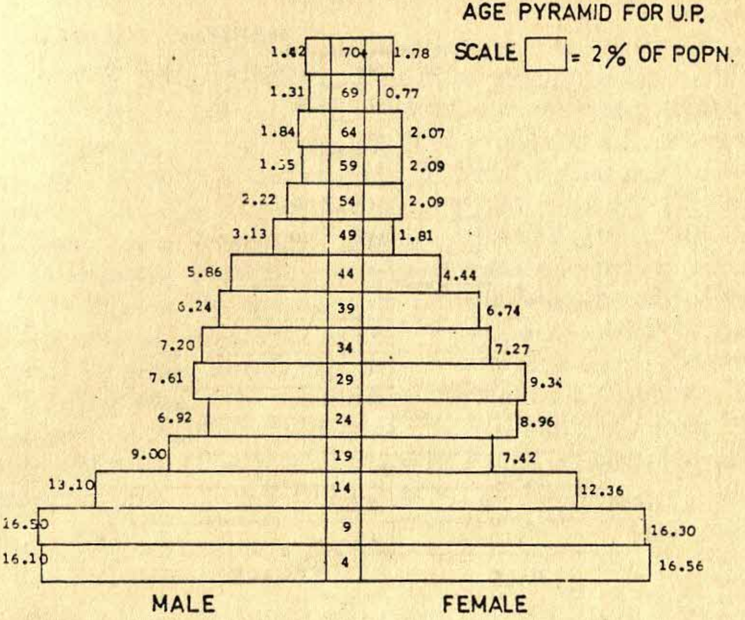
Regarding the fertility differences in these states for the young, middle and older couples, a difference is noticed among the older couples who are aged 45 years and above but such pronounced difference is not noticed among the young couples ($\leq$19 years). While older women in the U.P. state have, mean number of live births of 6, A.P. has only 5.7 and Kerala 4.6 (see Table 2.5). These differences in fertility are all important. Kerala has a lower fertility (significant at 1% level) than A.P. and U.P. among the women who are at the fag end of their reproductive period and whose proportion in the study population is more or less closer to each other in the three states. The pooled data showed an aggregate fertility for the country as a whole for the same age group is 5.2. A similar trend in fertility is more or less noticed among different age cohorts from 45 years downwards to 20 years. It is true also when we control the duration of married life along with the age of women. Hence such uniform differences in fertility of women in most of the age groups cannot be due to any chance factor. However, the youngest age group up to 19 years did not show any striking difference in fertility in the three states. Hence we have to infer that in future, young women may not manifest such extensive fertility difference that we have noticed now in the divers Indian states, if we continue the momentum of family planning and universal education. Another point is that, as seen earlier, from the age specific fertility rates and from the present Table 2.5 together we may conclude that fertility control measures may have to be uniformly given importance for all the age groups in U.P., but may be concentrated more among the young and middle aged group in A.P. and Kerala. Women in A.P. and Kerala almost stop procreation after their 35th year, but in U.P. they continue it unabated throughout their reproductive period.

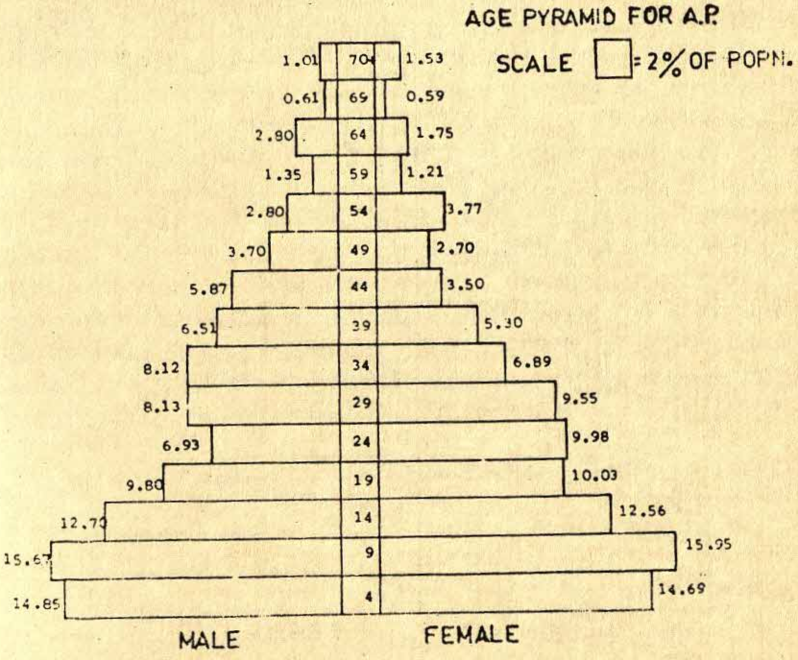
Age Pyramid

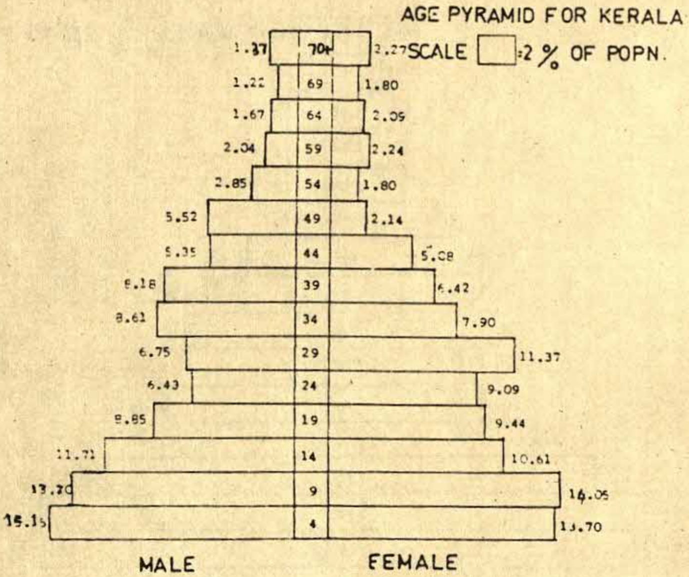
The age and sex distribution of the three states, viz., U.P., A.P. and Kerala is depicted in the form of a pyramid. In U.P., the young population, 0-14 age group, constitutes about 45 percent of the total population for both sexes. In A.P., it constitutes 43.2 and 43.1 for male and female children respectively, whereas in Kerala it is

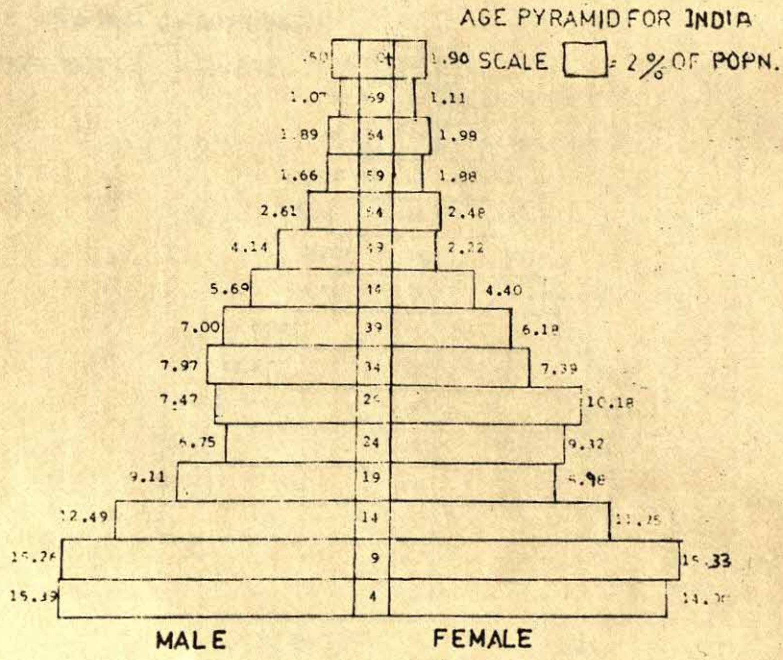
Table 2.5: *Mean Live Births according to the Duration of Marriage of Mothers and their Age in U.P., A.P., Kerala and India*

Respondents'	U.P.				A.P.				Kerala				India			
age	*10* years	*11-20*	*21+*	Total	10 years	11-20	21+	Total	10 years	11-20	21+	Total	10 years	11-20	21+	Total
19	1.2	2.0	-	1.2 (87)	1.4	3.0	-	1.4 (213)	1.0	1.0	-	1.0 (37)	1.3	2.0	-	1.3 (337)
20-24	2.0	3.7	-	2.0 (406)	2.4	3.1	-	2.5 (449)	1.6	2.5	-	1.6 (412)	2.0	3.1	-	2.0 (1267)
25 - 29	2.9	4.2	-	3.7 (498)	2.4	3.7	2.5	3.5 (497)	2.2	3.2	3.0	2.3 (749)	2.4	3.8	2.7	2.8 (1744)
30 - 34	2.7	4.9	6.4	4.9 (395)	2.2	4.1	5.1	4.2 (358)	2.2	3.4	4.0	3.0 (517)	2.2	4.1	5.3	3.9 (1270)
35 - 39	-	5.5	6.3	6.0 (375)	1.0	4.3	5.2	5.0 (280)	2.2	3.6	4.9	3.8 (432)	2.2	4.2	5.7	4.9 (1087)
40 - 44	2.5	-	6.6	6.6 (224)	-	3.2	5.1	5.1 (154)	1.8	3.8	5.1	4.7 (296)	2.0	3.7	5.6	5.4 (674)
45 +	-	-	6.1	6.0 (15)	-	4.0	5.7	5.7 (49)	-	3.6	4.8	4.6 (57)	-	3.7	5.4	5.2 (121)


AGE PYRAMID FOR U.P.


AGE PYRAMID FOR A.P.


AGE PYRAMID FOR KERALA
SCALE ☐ =2 % OF POPN.
1.37
70+
2.27
1.22
69
1.80
1.67
64
2.09
2.04
59
2.24
2.85
54
1.80
5.52
49
2.14
5.35
44
5.08
8.18
39
6.42
8.61
34
7.90
6.75
29
11.37
6.43
24
9.09
8.85
19
9.44
11.71
14
10.61
13.70
9
14.05
15.15
4
13.70
MALE
FEMALE


AGE PYRAMID FOR INDIA
SCALE ☐ = 2% OF POPN.
.50
70+
1.90
1.07
69
1.11
1.89
64
1.98
1.66
59
1.88
2.61
54
2.48
4.14
49
2.22
5.69
44
4.40
7.00
39
6.18
7.97
34
7.39
7.47
29
10.18
6.75
24
9.32
9.11
19
8.98
12.49
14
11.25
15.26
9
15.33
15.39
4
14.30
MALE
FEMALE

37.56 and 38.36 percent for males and females respectively. Thus, U.P. constitutes the highest proportion of young population followed by A.P. and Kerala. This may be due to the higher fertility prevailing there. Among the age group of 60 and above Kerala has the highest proportion compared to U.P. and A.P. This may be attributed to the higher expectation of life at birth existing in Kerala. The proportion of females is higher in Kerala and U.P. but not in A.P. In almost all countries at old ages females outnumber males. In all the three states the base of the pyramid is very broad and as the age increases it becomes conical. In general the shape of age pyramid for all the three states is same with little fluctuations in certain age groups. In Kerala the proportion of male population in the age group 20-29 constitute more than that in the age group of 30-39, which is probably due to high migration of men. The dependency ratio is high in U.P., followed by A.P. and Kerala.

Birth Intervals

Birth intervals including closed birth intervals are given in Table 2.6. Mean duration of closed birth intervals in the three states did not differ at all. It is 31, 29 and 31 months each in the U.P., A.P. and Kerala states respectively. However, open birth intervals significantly differed across the three states, viz., 35 months, 47 months and 49 months respectively in the U.P., A.P. and Kerala states. Kerala and A.P. have almost similar long duration of open birth intervals but U.P. has a low duration. Usually birth intervals are affected by breastfeeding, contraception and other marital variables. But breastfeeding is not a factor for the differences noticed in the duration of open birth interval here because it almost uniformly extends to 1 to 25 months in all the three states. Therefore, the greater use of family planning noticed in Kerala, and Andhra Pradesh may be the most probable determinant of longer duration of open birth interval.

Table 2.6: *Mean Duration of Closed and Open Birth Intervals in U.P., A.P. and Kerala*

Duration of birth intervals	States and mean value		
	U.P.	A.P.	Kerala
1. Closed birth intervals	31.0	29.1	31.1
2. Open birth intervals	34.8	47.4	48.9

Since the mean duration of breastfeeding is almost uniform, i.e., 25 months, 21 months and 22 months in the U.P., A.P. and Kerala states for the last baby breastfed, it does not show any fertility difference across the three states. Another interesting fact is the differential duration of post-delivery sexual abstinence. In U.P. and A.P. on the one side and Kerala on the other, the couples abstained for 8.7 and 9.0 weeks respectively and in Kerala for 11.3 weeks. These differences are based on local cultural practices. In Kerala the women stay for a longer period in their maternal home after delivery than in the other two states. Invariably the mother and child in Kerala are sent back to the house of the husband after trying the ornamental thread at the waist, which probably takes place before two months time. That is why in Kerala sexual abstinence after delivery is perhaps slightly for a long period of time. Such customs that would prolong abstinence are perhaps not present in the U.P. and A.P. states. In fact, in A.P. involuntary abstinence after delivery may be for about 8-9 weeks and in U.P. it is about more or less the same of course abstinence after delivery differs for the first and subsequent parities as well as in most places in India.

3

Religion and Value of Children

– K. Mahadevan & M. Somasundaram

The population of the U.P., A.P. and Kerala states are predominantly Hindus; in the former two states they constitute 80 percent each but in Kerala they are significantly less (62%). It is more or less similar to the census findings. According to the 1971 census, U.P., A.P. and Kerala have 83.3 percent, 87.6 percent and 59.4 percent of the Hindu population. Regarding the other religious groups, 15.5 percent, 8.1 percent and 19.5 percent are Muslims in these three states; Christians are negligible in U.P. (0.1%) but they are more in A.P. (4.2%) and very substantial in Kerala (21.1%). Compared to the 1971 census the proportions considered for the present study are more or less the same. While selecting the population for the present study, we have taken these samples at random and not based on the proportion of religions in the overall population. No doubt such differences on the basis of religion are common in any regions of India.

Table 3: *Percent of Population by Religion from the Study Area and according to 1971 census*

Religion	U.P		A.P.		Kerala		India	
	Study/Census		Study/Census		Study/Census		Study/1971 Census	
Hindus	80.5	63.8	80.4	87.6	62.3	59.4	73.4	82.7
Muslims	19.5	15.5	12.7	8.1	14.2	19.5	15.4	11.2
Christians	-	0.1	6.9	4.2	23.5	21.1	11.2	2.6

Among the Hindus the population is further stratified on the basis of different castes. Though the classical classification of the castes, viz., Brahmins, Kshatriyas, Vaisyas, Sudras and the untouchables, is on a different lines, here they are classified as: forward castes, backward castes, scheduled castes and tribes. Such classification is based on their present administrative divisions and socio-economic status. In U.P. the forward castes are represented by the Brahmins, namely the Tiwari, Tripathi, Misra, Sharma, etc., Kshatriyas are often known by the title of Singh and Thakurs; Vaisyas with the surname of Gupta and there are a few other specifically non-identifiable people who have no such surnames. These groups are all forward castes. The backward castes represented in the sample include mostly the scheduled castes.

In Andhra Pradesh, the forward castes are represented by the Brahmins known by the surnames of Sharma, Rao (common and secular name) titles, Kshatriyas are known by the surname Rajus, Agriculture communities (Sudras) include the Reddys and Kammas (Naidu); Vaisyas are known by the surname of Chettis and Gupta. The backward castes include the Balija, Kapu, Telaga and the service castes. The Naidu and Rao surnames are used by many communities. The scheduled castes include the Mala and Madiga etc.

In Kerala, the forward castes, viz., the Brahmins, are known by the surname of Namboodiri, Poti, Ilayethe, Moosathe; the Nayars are known by the surnames of Nair, Menon, Pillai, Panikkar, Kurup, and Nambiar; Wariyar and Pisharoti are temple servants. The backward castes are represented by the Ezhavas, Tiyyas, Nadars, Chettiars and Gounders; the service castes include the barbers, washerman and traditional musicians like marar and maternity assistants (like the Kaniyans) and fisherman. The scheduled caste population includes the Pulayas, Kurawas and Parayars.

The caste-wise representation in the sample reveals that the forward castes are more numerous in A.P., followed by a similar representation by BC in Kerala and SC and ST in U.P. The forward castes in the sample population include 21 percent, 37.5 percent and 19 percent respectively in the states of U.P., A.P. and Kerala. While U.P. and Kerala have more or less a similar forward caste representation, A.P. has a significantly higher percentage. The backward castes are 31 percent, 25 percent and 35 percent respectively in these three states. Regarding the representation of scheduled castes and tribes they are more in U.P. (29%), less in

A.P. (19%) and least in Kerala (11.2%). Taking the SC, ST and the BC population together it can be seen that U.P. has the highest (60%) percent and A.P. (44%) and Kerala (46%) have a more or less similar representation. The highest representation of the economically and socially backward communities in U.P. might be a factor leading to her overall high fertility. Though Kerala has the highest representation of Christians, and the Muslims (35%) the former group, except for the fishermen and the Nadar, Christians, are economically and socially better off than even the forward caste population. These ethnographic scenarios provide a glimpses of the cultural diversity of the population within a state and among the three states.

Differential Fertility by Religion and Castes

Fertility among the three religious groups of the Hindus, the Muslims and the Christians significantly differs within and among the states of U.P., A.P. and Kerala. Even among the Hindus fertility varies between the Harijans and non-Harijans (caste Hindus). There is no uniform trend showing any single community manifesting the highest fertility in all the three states (see Table 3.1). Nevertheless, in U.P. and A.P., similar communities show more or less a higher level of fertility than in Kerala. In U.P., the Muslims (37.7) followed by the Harijans, have the highest birth rate and the non-Harijan Hindus (Caste Hindus, 32.6) have the lowest birth rate. Only the last community has a birth rate nearer to the national average and the rest of them have a higher birth rate than the national average (CBR 33). Regarding A.P., the Christians have the highest birth rate (51.0), followed by the Muslims (43.0) and the Harijans (35.9) and the caste Hindus (27.0) in this order. Comparing U.P. and A.P. together the fertility of the A.P. Muslims if significantly higher than that of the U.P. Muslims but the Christians have the highest rate in A.P. The Harijans in both the states have the same level of fertility. The Caste Hindus in A.P. have a lower birth rate than their counterparts in U.P. Coming to Kerala, except for the Fishermen Christians (38.7) all other communities have crude birth rates less than 30 which is lower than that of their counterparts in U.P. and A.P. The birth rate of Fishermen in Kerala is the third highest, next only to the Christians and Muslims in A.P. among the three states. When compared with the present birth rate at the national level (33 in 1983), it is observed that only the Caste Hindus of U.P. and A.P. have the same or lower rates. But in Kerala, all the communities, except the fishermen Christians, manifest much lower fertility. Several factors may be responsible for the existing variations in fertility among the different communities mentioned above, which can be seen in the chapter that follows. One thing is certain that special and urgent efforts are needed to tackle the high fertility of the Harijans, Muslims and Christians. The non-fishermen Christians of Kerala have the lowest fertility among all the communities in the three states. Therefore, the social-economic backwardness of the communities and the cultural differentials within the same religion and caste groups may be considered together while deciding on the future inputs of family planning programmes. A focussed differential strategy and input based on the level of the fertility of the communities and ecological regions rather than on state and district level may form the unit of programme planning and implementation in future.

Table 3.1: *Birth Rates by Religion and Caste in U.P., A.P. and Kerala*

Religious and caste groups	Birth rates (CBR)		
	U.P.	A.P.	Kerala
Caste Hindus	32.6	27.0	25.3
Muslims	37.7	43.0	28.4
Harijans	36.8	35.9	28.1
Christians	-	51.0	24.0
Christians (Fishermen)	-	-	38.7
Combined	34.5	31.8	26.8

Value of Children

Children are valued universally for fulfilling several aspirations, conventions, and obligations of parents, family members and society at large. These expectations from the children vary and change depending upon the cultural patterns and the level of modernization and social change of the particular society. No society exists that does not attach a certain degree of the value to children. A pioneering and comprehensive study of the value of children conducted cross-culturally in several Asian countries has revealed

(Arnold *et al*., 1975) that several dimensions of value exist in most of these countries for valuing children. They range from economic to cultural, social and psychological dimensions. No doubt these values exist individually or in combination; among the parents. Naturally, when more and more value items influence the parents, there might be greater intensity in desiring one or more sons. This question has been examined in the data provided here. Some of these have been studied giving emphasis to one or the other in several later studies conducted mostly in South Asian region. One such value dimension is the old age security value which has been studied in several regions of India and Bangladesh (Mahadevan, 1979; Vlassoff and Vlassoff, 1980; Cain, 1981). In other comparative study on the value of children in Indonesia and Nepal the importance of economic and cultural values of children has been reported (Nag, *et al*., 1978). Following these studies, several other attempts have been made on this theme in different countries. All these literature fully confirms the importance of diverse types of values prevailing in most places and they have a very high pronatalist influence too. Since we have a culturally heterogenous population in one and the same country, no attempt has been made hitherto to obtain a country-wide picture of the diversity and complexity of the concept of value of children and its proper antinatalist behaviour. The present effort more or less fills the void in the literature in this direction.

On the value of children, several aspects have been gathered. The first section discusses whether son or daughter is needed for the parents; why a daughter is unwanted and due to what factors. The subsequent sections go into the details of the dimensions of the value of sons. In addition to these, aspects like importance of the first son, two sons and subsequent sons, social security through sons and other sources have also been highlighted. The influence of some of these major factors on fertility behaviour has been examined. It is postulated that (a) the value of children is a major determinant of fertility and it differentially influences the population of the three regions studied; (b) several value dimensions are important for the same population which may be economical, social, cultural and psychological in nature.

Value of Son and Daughter and Fertility

When it was asked whether it was important to have a son for one or the other considerations, responses significantly varied between U.P. on the one side and A.P. and Kerala on the other ($Z = 28.3$, $P = 0.01$). Most of the people in U.P. (87%) showed keen interest in getting a son but only slightly more than half of the people in A.P. (59%) and Kerala (54%) showed such keenness. The finding is in conformity with our hypothesis that while greater value for the son exists in U.P., it is less in A.P. and lowest in Kerala. Their relationship with fertility behaviour also is accordingly confirmed. The value attached to the son significantly increases fertility within each state and among the three states as well. Those who subscribed to the greater value of the son in U.P. had 4.4 children as against others who did not bother about it (3.4 children). In A.P. and Kerala the trend was 3.9 as against 3.0 and 3.4 as against 2.3 children respectively. These differences are highly significant in all the states. The high percentage of population desiring a son in U.P. and the lower and lowest percent in A.P. and Kerala respectively can be linked with the trends in differential fertility in the three states – i.e., 4.4 in U.P. followed by 3.9 in A.P. and 3.4 in Kerala (see Table 3.2). Hence we can fully confirm and say that the value of sons is strong pronatalist factor irrespective of all other considerations.

Table 3.2: *Percent Distribution of Respondents and Mean Live Births according to Value of Son in U.P., A.P., Kerala and India*

Value of son	U.P.		A.P.		Kerala		India (Pooled)	
	%	Mean	%	Mean	%	Mean	%	Mean
Yes	87.2	4.4	59.2	3.9	54.2	3.4	65.9	3.9
No	12.8	3.4	40.8	3.0	45.8	2.3	34.1	2.7

Why Daughters are Unwanted?

Our assumption was that daughters were generally disfavoured compared to sons in all the states. The main reason for this dislike would probably be the excessive investment needed for the marriage of the daughters. This hypothesis has been tested here (see Table 3.3). The respondents were asked whether they disliked or liked daughters because of the existing demand for dowry? The

Table 3.3 confirms that daughters are disliked most in U.P. (73%) and far less in A.P. (33%) and Kerala (27.4%). These findings in A.P. are unexpected because of the low level of literacy there but the findings from Kerala are as expected. However, taking together the findings from all the states, at the national level the dislike of daughters due to dowry is only among less than half of the population (43%). When this factor is correlated with fertility behaviour, uniformly, in all the three states, fertility of the parents did not decline significantly on account of the concern they have shown for paying dowry for their daughters' marriage in the future. The trend of all fertility differences was from 4.4 to 3.8, 4.0 to 3.3 and 3.6 to 2.7 in U.P., A.P. and Kerala respectively and 4.1 to 3.1 for the country as a whole. This confirms that the influence of dowry operates among parents only after they get more number of girls and not earlier. But this factor does not have an extensive influence in U.P. for two reasons. First of all, only slightly more than a quarter of the population has experienced the dowry question; secondly, most of the marriages in U.P. take place very early primarily to avoid the payment of dowry. Several respondents have confirmed that they arrange marriages at young ages before the boy could become an important person. When the boy is educated and employed his parents demand more dowry.

The dowry problem may be linked up with sharing of property and paying other forms of gifts. Since parents don't get much social security and benefits from daughters they may consider the investment on daughters as not rewarding to them. Hence they may not like daughters in order to avoid all sorts of investment on them, when they are not economically better off or even otherwise.

Dimensions of Value of Sons

A dozen dimensions of value have been identified for the special preference shown to son(s) in all the three states. They are: (1) economic support during old age, (2) better economic benefits of the family, (3) receiving dowry, (4) salvation of the parents, (5) continuity of family tradition (lineage), (6) other family obligations, (7) to inherit family property, (8) becoming adult member and getting status, (9) company for the children and parents, (10) physical force for power, and (11) for physical protection of old parents. Of these value dimensions the first three items are economic in

Table 3.3: *Opinion of the Respondents regarding their Value of Daughters in the context of Payment of Dowries and their Mean Live Births in U.P., A.P., Kerala and India*

Value of daughter in the context of paying dowry	U.P.		A.P.		Kerala		India	
	%	LB	%	LB	%	LB	%	LB
Dislike daughters because of dowry	72.9	4.4	33.1	4.0	27.4	3.6	43.1 (2802)	4.1
Like daughters in spite of dowry	27.1	3.8	66.9	3.3	72.6	2.7	56.9 (3698)	3.1

Note: LB Means live births. Z = 4.2, P = 0.01 for A.P. and Kerala.

nature, the next 4 to 8 items are socio-cultural in their characteristics; item 9 is psychological; the last two items, viz., 10 and 11 are for physical protection in the village and of old parents as well as social status (see Table 3.4).

Among these items, economic support during old age, physical support to the old parents, salvation for the parents by doing ritual functions and to maintain the traditional link (lineage) in the family are found to be uniformly important in all the three states except for certain differences in Kerala. Importance given to all these aspects is almost universal in U.P. and A.P., but in Kerala it is significantly less for most of them except old age security. This confirms our hypothesis that (1) old age security is the most important value dimension that increases fertility all over India; and (2) cultural dimensions of value of children are also important as a pronatalist force in most places in our country, though it is somewhat less in Kerala. Regarding other value dimensions they are often similar in U.P. and A.P., except in the case of inheriting family property and receiving dowry. Regarding the former, most people in U.P. are interested but not so in A.P. As for the latter (dowry), more people are interested (44%) in A.P., but far fewer in U.P. (13%) and Kerala (8%). Value aspects exclusively found more importance in Kerala, in addition to the first four items which are common to one and all, are: (1) need for children as a force for dominating in family and village life (67%) which is much less importance in A.P. (48%) and U.P. (41%). (2) Sons bring more economic prosperity to the family; and (3) sons provide company to the other children (see Table 3.4). For the country as a whole, eight items of value dimensions have importance for more than fifty percent of the population. In the order of importance they are: (1) to provide physical support to old parents and to stay with them (91.9%); (2) to render old age economic support (88.5%); (3) to enable the salvation of the parents by doing ritual functions after their death (87.4%); (4) to provide traditional familial link (lineage) (81.3%); (5) to get recognition of adulthood and status (71%); (6) to meet general family obligations (70.6%); and (7) for giving company to the children (56.7%) and (8) to dominate with physical force in the family and village (54%).

Table 3.4: *Percent Distribution of Respondents in U.P., A.P., Kerala and India by Different Dimensions of Value of Son(s)*

Value dimensions	U.P.	A.P.	Kerala	India
Economic support during old age	98.5	86.3	82.4	88.5 (5784)
Economic prosperity in the family in general	33.7	31.2	48.0	38.4 (2497)
Receiving dowry	13.4	44.4	8.3	21.0 (1362)
Salvation to the parents by doing ritual functions	92.3	93.2	78.9	87.4 (5678)
Provide traditional links (lineage)	94.5	95.9	59.1	81.3 (5284)
Meet family obligations	91.1	81.9	39.7	70.6 (4591)
Inherit family property	90.3	42.7	23.4	49.9 (3245)
For becoming adult member and getting status	100.0	83.7	37.6	71.0 (4614)
Company to the other children	44.4	39.6	80.3	56.7 (3687)
For physical force to dominate in the family and village	41.2	48.4	68.6	54.0 (3507)
Physical support and for staying with old parents	99.3	90.2	87.1	91.9 (5975)

When the respondents in large number believed in the importance of most of the value dimensions, fertility showed an often significant increase, except for two less important aspects, viz., receiving dowry and providing company to the children. Among the pronatalist factors four dimensions of values, viz., (1) to meet family obligations; (2) to render physical support and to stay with parents during old age; (3) to give old age economic security and (4) to provide economic prosperity in the family in general showed a definite pronounced increase in fertility in most of the states and in the country as a whole. Even the other items also showed a pronatalist trend but not uniformly in all the three states. However, such a relationship was noticed in one or the other states in most cases. For example, even the value item on dowry showed significantly higher fertility in Kerala. A similar trend is also noticed in A.P., but no such relationship is found in U.P. It is in conformity with the reality of dowry payment in these states. Nowadays dowry has become a menace in the A.P. and Kerala, but not so in U.P. because of the child marriage as stated earlier. Similar is the pattern of relationship in all the three states with respect to the value item to provide company to the children. The item of salvation to the soul of the deceased showed significant pronatalist influence in U.P. and A.P., but not in Kerala; it is consistent with the greater modernization and secularisation of attitudes seen in Kerala as against the traditional religious attitude prevailing in U.P. and A.P. A similar trend is noticed with respect to the value on lineage. However, two other items of the value dimensions, viz., (1) to inherit family property and (2) to become an adult member and get status did not show any significant increase in fertility in most states, but at the aggregate level they showed a definite increase in fertility difference. Thus, it can be stated without any reservation of whatsoever, that most of the important value dimensions, either economic, cultural, social and physical support, extensively act as pronatalist forces to be reckoned with in most regions of India. No doubt regional and cultural variations make differences in the level of their influence on fertility behaviour. Therefore, concerted action to identify a new policy and educational themes should be expeditiously taken up to diminish or nullify their pronatalist influence. Suitable social and old age securities are overdue in this direction (see details at the end of this section). When son(s) is valued mostly for reasons of security of one type or other by the parents and family, how can we convince them to stop without son(s) in the absence of alternative security measures? It is a most serious factor that deserves the highest priority in the family planning programme (see Table 3.5).

Table 3.5: *Mean Live Births according to Value Dimensions of Son(s) in U.P., A.P., Kerala and India*

Value dimensions	U.P.		A.P.		Kerala		India	
	Important	Unimportant	Important	Unimportant	Important	Unimportant	Important	Unimportant
1. Economic support during old age	4.3	3.4	3.7	2.8	3.0	2.5	3.7 (5754)	2.6 (746)
2. Economic prosperity in the family in general	4.3	4.3	4.1	3.3	3.3	2.6	3.8 (2497)	3.4 (4003)
3. Receiving dowry	4.2	4.3	3.6	3.5	2.9	3.7	3.7 (1362)	3.5 (5138)
4. Salvation for the parents by doing ritual functions	4.3	4.0	3.6	2.7	2.9	2.9	3.6 (5678)	3.1 (822)
5. Provide traditional link (Lineage)	4.3	4.3	3.6	2.6	2.9	2.9	3.7 (5284)	3.0 (1216)
6. Meet family obligations	4.3	3.2	3.7	3.0	3.0	2.9	3.8 (4591)	2.9 (1909)
7. Inherit family property	4.3	4.2	3.5	3.6	3.0	2.9	3.9 (3245)	3.4 (3255)
8. For becoming adult member and getting status	4.3	-	3.6	3.3	2.9	2.9	3.8 (4615)	3.0 (1885)
9. Company to the children	4.1	4.4	3.7	3.5	3.0	2.7	3.4 (3687)	3.4 (2813)
10. For the physical force to dominate in the family and village	4.4	4.2	3.7	3.4	3.1	2.5	3.6 (3507)	3.5 (525)
11. Physical support and staying with old parents	4.3	4.0*	3.6	2.8	3.0	2.6	3.6 (5975)	2.7 (525)

Note: *Sample less than ten.

Number of Male Living Children and Fertility

The number of male living children and their influence on fertility may further provide support on the question of value of children on a definite basis. It is a very sensitive variable to measure the value of children because most parents continue to go in for large families primarily to get the desired number of sons. Nodoubt other unwanted babies might also be born without particular planning but their number is likely to be very small (table not given). It is interesting to note that the percentage of families without male children is very low in U.P. (17%) and A.P. (17%) but somewhat higher in Kerala (21%). Percentage of families with a single male child is proportionately higher in Kerala (40%) and A.P. (40%) but much lower in U.P. (20%). Regarding the availability of two male children, the trend reverses; in U.P. 27 percent of the families have two male children which is 26 percent in A.P. and 25 percent in Kerala. Families with three or more male children further reflect the increasing preference in U.P. for sons as against much less preference in A.P. and a negligible preference in Kerala.

Table 3.6 fully confirms the hypothesis that the number of sons in the families, irrespective of all other factors, has a direct relationship with high fertility. It is uniformly noticed among the young, middle aged and older couples and in all the three states and in the country in general without any exception. These findings further conclusively support the earlier data on the importance of value of sons as a major pronatalist factor throughout India, though it is much less otherwise in Kerala.

Types of Present-day Social Security

The single largest percent of people nowadays uniformly in all the three states depends on the first son for social/old age security (35 %). It is higher in A.P. (41 %) and in U.P. (36 %) but far less in Kerala (28 %) ($z = 3.3$; $p = 0.01$). Next to the exclusive dependence on the first son, a very high percent of people in U.P. alone (38 %) depend on the first and last sons. Customarily also, the parents live with the first and/or last son in U.P. but no such importance is given to the last son in A.P. and Kerala and hence it is negligible in both these states. On the other hand, only in Kerala a tenth of the parents depend on their daughters for old age/social security. Such dependance is less in U.P. (7 %) and negligible in A.P. (3 %). It is therefore desirable to promote the value of daughters by parents in order to enable daughters to render support to them during their old age through intensive education in and out of school to avoid excessive value being attached to sons

Table 3.6: *Mean Live Births according to Duration of Marriage of Mothers and Number of Male Living Children in U.P., A.P., Kerala and India*

Number of male living children	U.P.				A.P.				Kerala				India			
	≤10 years	11-20	21+	Total	≤10 years	11-20	21+	Total	≤10 years	11-20	21+	Total	≤10 years	11-20	21+	Total
No male living child	1.6	3.5	4.8	2.3 (332)	1.7	2.9	3.8	2.3 (342)	1.5	2.5	3.6	1.9 (528)	1.6	2.9	4.1	2.1 (1202)
1 son	2.1	4.2	5.8	3.3 (589)	2.0	3.4	4.1	2.9 (799)	1.9	2.9	3.9	2.4 (1000)	2.0	3.4	4.5	2.8 (2388)
2 sons	3.0	4.8	6.4	4.8 (572)	2.7	4.0	5.2	4.0 (518)	2.6	3.6	4.6	3.4 (635)	2.7	4.2	5.4	4.0 (1725)
3 sons	3.6	5.3	6.6	5.6 (319)	3.7	4.8	5.9	5.1 (233)	3.4	4.2	5.7	4.5 (229)	3.5	4.9	6.1	5.2 (781)
4+ sons	2.3*	6.1	7.2	6.5 (188)	-	6.3	7.5	7.0 (108)	4.0	6.5	7.0	6.7 (108)	5.0	6.3	7.3	7.3 (404)

* **Sample** size less than ten.

and to avoid discrimination shown against daughters. Notably in Kerala, 24 percent of the respondents do not fix upon first or last or on any particular sibling for security which is a progressive change and the same may have to be promoted in U.P. and A.P. Further research in this field in Kerala may throw more light on how Kerala could achieve less gender value for old age security than all other states in India. Perhaps greater dependence on the first and last sons together seen in U.P. forms yet another major pronatalist force at least among the single largest section of the respondents (38.5 %). Hence special legal changes and education may be introduced in U.P. to break this dual dependence and to develop dependence on all children, irrespective of the gender and parity to reduce fertility, as seen in Kerala. Since at present children alone form the social security to parents, we need urgent action to introduce other sources, of social security to reduce the value of children and thereby fertility.

A few viable new social security measures on the following lines can be considered in order to minimize these exclusive depending on son(s) and to reduce its pronatalist influence in our country. Why not we consider certain amount of old age pension by the government or a life insurance policy to be given to parents at the age of sixty, when they have no child/son to support their old age needs.

Table 3.7: *Percent Distribution of Respondents in U.P., A.P., Kerala and India by Expected Old Age Support*

Expected old age support	U.P.	A.P.	Kerala	India
1. No need/No idea	7.9 (158)	21.5 (431)	22.5 (562)	17.7 (1151)
2. First son	36.4 (729)	40.9 (818)	28.2 (706)	34.7 (2253)
3. Last son	2.2 (44)	1.0 (20)	2.8 (70)	2.1 (134)
4. Daughter	7.4 (149)	3.4 (67)	9.6 (241)	7.0 (457)
5. Any one	0.2 (3)	32.5 (651)	4.7 (118)	11.9 (772)
6. All	7.4 (148)	0.2 (4)	24.4 (607)	11.7 (759)
7. First and last	38.5 (769)	0.4 (9)	7.8 (196)	15.0 (974)
Total	100.0 (2000)	100.0 (2000)	100.0 (2500)	100.0 (6500)

4

Socio-Economic Status and Fertility

– K. Mahadevan & B. Lekha

The socio-economic development of the three states, U.P., A.P., and Kerala, varies according to several indicators of development. By 1980 the net domestic products of these states accounted for significant variations. It was Rs. 1,39,554 for U.P., Rs. 69,754 for A.P. and Rs. 33,142 million for Kerala. In these states employment of the total population in the organised sector accounted for 24.6, 14.8 and 10.4 lakhs respectively in U.P., A.P. and Kerala by the middle of 1982. The per capita income at constant prices in 1981-82 was Rs. 718 in A.P., Rs. 667 in Kerala and Rs. 510 in U.P. states (c.s.o. - 1982). The literates of the population, according to the 1981 census, were 27.4 per cent, 29.9 per cent and 69.2 per cent in U.P., A.P. and Kerala respectively; for women the literacy status in these states stood at 14.4, 20.5, and 64.5 per cent respectively.

Housing Conditions

The socio-economic status differentials of the population can be roughly gauged by classifying them according to the housing conditions. Though it is influenced to a certain extent by the innovativeness of the people, this variable does not reveal any under-reporting as in the case of family income. Among the three standard categories of kutcha, semi pucca and pucca houses, the first type of houses are maximum in Kerala (33%) followed by A.P. (24%) and U.P. (5%); semi pucca houses, on the other hand, are more in A.P. (66%) followed by U.P. (64%) and Kerala (55%). Regarding pucca houses, they are more in U.P. (31%) followed by Kerala (12%) and least in A.P. (10%). This reveals the economic stratification of the population in each state, which means that the single largest group of families in U.P. (95%) live in relatively better houses followed by A.P. (76%) and lastly Kerala (67%). Interestingly the housing conditions of the family showed more or less a definite negative association with fertility behaviour in all the three states but not for the country in general.

Table 4: *Percent Distribution of House Types and Mean Live Births according to the Same Variable in U.P., A.P. and Kerala and India*

	U.P.		A.P.		Kerala		India	
House types	%	LB	%	LB	%	LB	%	LB
Kutcha	5.3	5.1	24.4	3.5	32.6	3.1	21.7	3.4
Semi pucca	64.1	4.2	66.1	3.6	55.1	2.9	61.3	3.5
Pucca	30.6	4.1	9.5	3.3	12.3	2.5	17.0	3.5

When the average number of rooms in the houses are considered, they are more in Kerala (3.9%) followed by U.P. (2.4%) and least in A.P. (2.1%). It may mean different things based on the construction pattern of the houses in these states. But availability of more rooms may provide privacy which is demographically important. Added to this the number of persons occupying these rooms are in the reverse order. Because in the U.P. state, 5.3 persons occupy less space of 2.4 rooms as against 4.5 persons occupying 3.9 rooms in Kerala and 4.6 persons occupying 2.1 rooms in A.P. These findings indicate that in Kerala people live with more space and privacy in their houses than in A.P. and U.P. The overcrowded living in the other two states may affect health and also cause inconvenience for using temporary contraceptives.

Family Type

Joint family organisation in all the three states has under gone a definite change leading to large-scale formation of nuclear families in all the three states. Exclusive nuclear families are more and their percentages are almost similar in A.P. (62%) and Kerala (61%), U.P. however, has less percentage of such families (56.9%). Nuclear families with unmarried single dependents, other than children, are the highest in Kerala (22%) and less in A.P. (17.5%)

and least in U.P. (15%). It shows that Kerala society cares a lot more for the related dependents than the other two states. Regarding the joint family, it is highest in U.P. (27.8%) A.P. comes next (20.5%) and it is almost the same in Kerala (16.5%). These findings point out the greater traditional set-up of family organisation existing now in U.P. state than in the other two states. (See Table 4.1).

In all the three states family organisation shows significantly higher fertility in nuclear families and it is so in the country as a whole. On the other hand, fertility is the lowest in joint families, in all the states. In transitional families, i.e., nuclear families with one or more single dependents other than children, fertility is manifested at an intermediate level between the nuclear and the joint families. Whether in the nuclear or joint families, fertility is highest in U.P. less in A.P. and least in Kerala. These inter-state differences in fertility are significant in both the nuclear and joint families. Hence we may attribute the inter-state differences in fertility to other factors than family organisation.

Table 4.1: *Percent Distribution of Family Type and Fertility according to the Same variable in U.P., A.P., Kerala and India*

	U.P.		A.P.		Kerala		India	
Family types	%	LB	%	LB	%	LB	%	LB
Joint family	27.8	3.5	20.5	3.2	16.5	2.0	21.2 (1378)	2.9
Nuclear with single dependents	15.3	4.0	17.5	3.2	22.3	2.5	18.7 (1216)	3.1
Nuclear family	56.9	4.7	62.0	3.8	61.2	3.3	60.1 (3906)	3.8

Educational Status

The data from the present study comprising one developed and two less developed districts, each from the three states are presented here. More or less a similar trend in education, as seen above on the basis of 1981 census, is noticed here. Education of both husband and wife is highest in Kerala and lowest in U.P. and it is at an intermediate level in A.P. While 41 and 50 per cent of men in U.P. and A.P. are illiterate, only 10 per cent of their counterparts in Kerala are illiterates. As for women, again literacy is highest in Kerala State, followed by A.P. and least in U.P. The combined literacy level of the women of the latter two states is also much less than the literacy level of women in Kerala. A comparison of the literacy level of men and women within and across the three states also shows significant differences in U.P. and A.P. but not in Kerala ($z = 12.6, p = 0.01$). The differences of literacy level between the husband and wife is the highest in the U.P. (44.6%) still less in A.P. (19.5%) and negligible in Kerala (2.9%). However, the percent of the level of educated men, surprisingly, does not show any significant difference among all the three states, as it ranges from 8.3 per cent in A.P. to 11.9 per cent and 11.4 percent in U.P. and Kerala respectively. Thus, the level of higher education from intermediate and above is slightly higher in U.P. than in Kerala. However, as for the higher education of women, the trend is again reversed in favour of Kerala. While 7.9 percent of women in Kerala state has secured intermediate and above level of education, only a negligible percent of them (0.8 %), both in U.P. and A.P. (0.8 %) states also have achieved the same level. This trend in higher education at all levels is maintained by the women in Kerala than their counterparts in the other two states. In fact at the school final and below level more Kerala women have achieved education than their U.P. and A.P. sisters. In other words tremendous advances in education of women have been achieved in Kerala at all levels but the other two states as well as many other states in India have to develop a lot to improve the education of their women (see Table 4.2).

According to table 4.2 the educational status of the husband and wives has a clear negative association with the fertility of the couple. A unique common trend noticed in all the three states and in India in general is that a higher educational level of women consistently reduces the overall fertility more than it does even if the educational level of the husband is the same. And at different levels of education the fertility is, in fact, significantly low when wives are educated. But such pronounced differences are only in the U.P. and A.P. states at intermediate level and above. For the country, as a whole also, fertility declines significantly at all levels of schooling and particularly higher education, when women are educated. Among the illiterates, inter-state differences in fertility do not vary significantly but they are still highest in U.P. and surprisingly the second highest in Kerala and lowest in the A.P. state. When the educational status of the husband and of the wife are taken together and cross-tabulated, interesting findings are observed. In all the states and in the country as a whole fertility is highest when both of them are illiterates; on the other hand fertility is lowest for the couple who are possessing the highest education, irrespective of all other factors. Further, a negative association between the educational status of husband and wife and fertility is distinctly seen in all the states, and also for the country as a whole except with slight inconsistancies noticed in the trend with the education of husband alone in Kerala state. Thus, it is all the more important that the highest priority should be given to the education of women in states like U.P. and A.P. to bring down their fertility drastically to the minimum level, since the education of husband alone will not drastically reduce the fertility level. (Education of wife - see table 4.2 a, see in Appendix).

Economic Status

The per capita income of U.P., A.P. and Kerala was Rs. 510, Rs. 718 and Rs. 667 respectively for the constant prices in 1981-82 (CSO, 1982). According to the data the lowest annual income of Rs. 5,000 or less is found to be significantly more among people in the U.P. state (38%) followed by A.P. (20.5%) and Kerala (15.5%). These differences are important and reveal the gravity of the problem of widespread poverty in U.P. though it is much less in A.P. and least in Kerala. However, the single largest groupr of people in all the three states have an equal (40%) annual income ranging from Rs.5000 to 9,000. When the income slab goes up further, the economic status of more people is better in Kerala, followed by A.P. and U.P. up to the slab of Rs. 21,000 per annum, though the percentages of such people in all the three states are very low. However, in the income group of Rs.21,001 and above per annum, the trend changes in favour of A.P. (7.1%) followed by Kerala (5.9%) and U.P. (2.7%). Thus, we see that U.P. state is economically very backward. Economic differences between the A.P. and Kerala states are not drastically different as compared to

Table 4.2: *Mean Live Births and Percentage of Respondents according to Education of Husband and Wife in U.P., A.P., Kerala and India*

Educational levels	U.P				A.P.				Kerala				India	
	*Husband	%	Wife	%	Husband	%	Wife	%	Husband	%	Wife	%	Husband	Wife
Illiterates	4.8	41.0	4.4	85.6	3.9	50.1	3.8	69.6	4.0	10.1	4.2	13.0	4.2 ** (2074)	4.2 (3428)
1-5 class	4.5	19.6	3.6	9.6	3.6	18.2	3.2	16.4	3.4	30.0	3.3	30.4	3.7 (1455)	3.3 (1280)
6-8 class	3.8	13.5	3.2	3.0	3.1	10.8	2.6	8.3	2.9	20.7	2.9	17.8	3.2 (1003)	2.8 (672)
9-11 class	3.6	14.0	3.4	1.0	3.0	12.6	2.6	4.9	2.4	29.8	2.3	30.9	2.7 (1278)	2.4 (890)
Intermediate	3.4	11.9	2.7	0.8	3.0	8.3	2.2	0.8	2.3	11.4	1.8	7.9	2.8 (690)	1.9 (230)

* Percentage of respondents ** Number of respondents.

U.P., but very poor and very rich people are relatively more in A.P. than in Kerala (see table 4.3) state.

Table 4.3: *Percent Distribution of Respondents by Income in U.P., A.P., Kerala and India*

Income groups	U.P.	A.P.	Kerala	India
≤- 5,000	37.8	20.5*	15.5**	23.9
	(753)	(409)	(388)	(1552)
5,001 - 9,000	40.1	40.8	40.8	40.6
	(803)	(816)	(1021)	(2640)
9,001 - 13,000	13.0	19.0	21.3	18.0
	(261)	(380)	(531)	(1172)
13,000- 17,000	4.2	8.4	10.6	7.9
	(83)	(169)	(264)	(516)
17,001- 21,000	2.2	4.2	5.9	4.3
	(44)	(85)	148)	(277)
21,001+	2.7	7.1	5.9	5.3
	(54)	(141)	(148)	(343)

*Z = 12.0, P = 0.01 for U.P. and A.P.;
**Z = 4.6, P = 0.01 for A.P. and Kerala.

Income shows a somewhat negative association with fertility when we leave aside the lowest income group of Rs. 5,000 per annum. A similar trend as also found when the duration of married life is controlled in all the states. Fertility of this lowest income group is more or less equal to the fertility of the richest group in all the three states; however, for the aggregate level, fertility is higher in the same income group as compared to the richest persons. When we control the duration of the married life of women, such similarity in fertility between the lowest and highest income groups does not exist uniformly. In fact, in such a situation the lowest income group manifests relatively more fertility in many cases than the other extreme income groups. Thus, we see a pattern that fertility is relatively low in the lowest income group, which is below the poverty line, somewhat higher for the lower middle class and middle class and it declines further for the upper middle class and the rich people (see table 4.4).

Table 4.4: *Mean Live Births according to the Duration of Marriage of Mothers and Family Income in U.P., A.P., Kerala and India*

	U.P.				A.P.				Kerala				India			
Income groups	≤ 10 years	11-20	21 +	Total	≤ 10 years	11-20	21+	Total	≤10 years	11-20	21 +	Total	≤ 10 years	11-20	21 +	Total
≤ 5000	2.1	4.7	6.4	4.2 (755)	2.0	3.8	4.9	3.0 (409)	1.8	3.1	4.4	2.4 (388)	2.0	4.1	5.9	3.4 (1552)
5001 - 9000	2.2	4.8	6.6	4.4 (803)	2.1	4.0	5.3	3.7 (816)	2.1	3.5	4.8	3.0 (1021)	2.1	4.1	5.7	3.6 (2640)
9001 - 13000	2.4	4.7	6.3	4.3 (261)	2.2	3.8	5.2	3.7 (380)	2.0	3.7	5.3	3.1 (531)	2.1	4.0	5.5	3.6 (1172)
13001 - 17000	2.0	4.3	6.3	3.9 (83)	1.8	3.6	5.4	3.6 (169)	1.8	3.6	5.4	3.1 (264)	1.8	3.7	5.5	3.4 (516)
17001 - 21000	1.9	4.1	6.2	4.2 (44)	2.2	3.9	5.7	3.9 (85)	1.7	3.3	4.9	2.7 (148)	1.8	3.6	5.5	3.3 (277)
21001 +	2.2	4.5	5.6	4.2 (54)	2.1	3.4	4.7	3.4 (141)	1.7	2.8	4.2	2.5 (148)	1.9	3.3	4.7	3.1 (343)

Dimensions of Opportunity Costs

In the past mothers in India normally would not openly say that getting more children might affect the conforts and opportunities of parents in one way or the other, even though they suffered on account of pressure of time and over-work resulting from having a large family. Such problems (opportunity costs) were not taken seriously by rural mothers, under the presumption that their primary role in life was procreation. But the traditional roles of women have been undergoing a change nowadays on account of the development of the small family norm and improvement in the status of women. Under the changed circumstances it is hypothesised here that various opportunity costs may be seriously considered by mothers and those who consider them might go in for a small family. A few such opportunity costs were posed to the mothers in order to find out how far their reactions varied across these states and which of the opportunity costs were considered important by the largest group of parents and so on. The items of opportunity costs are the following: (a) no scope for getting rest; (b) inability to enjoy leisure time; (c) no facility to read and acquire knowledge; (d) inconvenience in taking treatment; (e) paucity of time to look after all the children; (f) inadequate opportunity for school/college education; and (g) difficulty in taking up jobs outside home. These items were dichotomised into yes and no to know their importance. Those who subscribed to the problem of opportunity cost would say 'yes' to each item and others might disagree with them.

The findings from table 4.5 more or less confirmed that mothers by and large admitted without reservation the various inconveniences due to more babies. Their responses significantly varied among the women of the two or all the three states on most of the dimensions of opportunity costs. The four major opportunity costs felt by women in two or all the three states are: (a) no scope for getting rest, (b) no convenience in taking treatment, (c) inadequate time to look after children and (d) not able to enjoy leisure time. All other items are important only among a negligible proportion of women. The first item is important in all the three states, but it is significantly more in U.P. (69%) and similar in A.P. (53%) and Kerala (53%). However, difficulty to enjoy leisure time is found more in Kerala (37%) followed by U.P. (34%) and lastly

A.P. (27%). But the other two dimensions of opportunity costs, viz., no convenience in taking treatment and lack of time to look after needy children are surprisingly found equal in U.P. and Kerala but they are significantly less in A.P. It may be because of the realisation of modern ways of life in Kerala through education and the hardships faced by women in U.P. through high fertility. For the general understanding of opportunity costs in the three states, an index on these items was also prepared. The opportunity cost index revealed that inter-state variations exist on this factor among mothers. More mothers in Kerala and U.P. realised their difficulties in enjoying life or doing one or more of their activities to their satisfaction. This is because women in Kerala have realised it through higher education and women in U.P. may have realised it due to their present large families. All these findings give rise to the idea that giving greater emphasis to problems related to opportunity costs resulting out of large families can be an effective and successful theme for educating and motivating women to limit their family size.

Table 4.5: *Percent Distribution of Respondents in U.P., A.P., Kerala and India by Different Opportunity Costs*

Dimensions of opportunity costs	U.P.	A.P.	Kerala	India
No scope for getting rest	69.2 (1384)	52.9 (1058)	53.3 (1333)	58.1 (3775)
Not able to enjoy leisure time	34.2 (685)	26.8 (537)	37.3 (932)	33.1 (2154)
No facility to read and acquire knowledge	2.2 (44)	0.7 (15)	4.2 (106)	2.5 (165)
No convenience in taking treatment	47.4 (949)	12.2 (245)	46.0 (1149)	36.0 (2343)
Inadequate time to look after children	47.3 (946)	14.1 (282)	46.9 (1173)	36.9 (2401)
No opportunity for school/ college education	2.3 (47)	0.2 (4)	1.3 (32)	1.3 (83)
Affected in taking up job(s)	0.2 (3)	10.8 (216)	6.2 (155)	5.8 (374)

Fertility differences within and among the three states varied for the major four items of opportunity costs which were widely felt as important by the respondents. Interestingly in all the places, women who subscribed to one or more opportunity costs clearly manifest more fertility. Therefore, this factor did not depress the past fertility. Nodoubt these women may not produce children in future because they have realised the importance of the importance of the opportunity costs on the basis of their present high fertility. If they had not experienced such high fertility, perhaps, they would not have bothered about these opportunity costs. The realization of these costs are the effect of high fertility and they, in all probability, would not have influenced their present fertility. Of course, young women and women belonging to the upper socio-economic strata would have limited their family size consciously with the direct or indirect influnce of these opportunity costs. When society changes and modernisation spreads among women these factors might certainly act as casual factors for reduction in future fertility. The experiences of high parity women on several aspects of opportunity costs can be made use of for motivating couples who have not accepted contraception so far (see table 4.6 in appendix).

Occupation of the Couple

Traditional occupation of men based on the classical classification of Indian society on the basis of caste has differentially changed in these three states giving rise to occupational mobility in various forms. Nevertheless, the occupations of priesthood, agriculture and wage-labour continue to persist among large sections of society without much change. Over fifty per cent of the men in Kerala (53%) as against only less than 30 per cent of men in U.P. and A.P. work in new and higher occupations. This reveals the large scale upward occupational mobility among men in Kerala. On the other hand, the single largest percent of men in A.P. (40%) are agricultural labourers but not so in U.P. and Kerala, which makes A.P. the most traditional in pursuing occupations. Skilled professionals among men are numerous in Kerala (24%) as expected. The figure is less in U.P. (16%) and the lowest in A.P. (8%). Petty business people are also more in Kerala (13%) and somewhat fewer in U.P. (9.5%) and A.P. (7.1%). Rural artisans are significantly more in Kerala (8.4%) as compared to U.P. (2.7%) and A.P. (2.8%). This reflects the massive growth in housing industry now in Kerala with the spurt of remittance of foreign money from the emigrants of Kerala state; but this is not found in the other two states. From the pooled data it is seen for the country as a whole that the single largest segment of men work in agriculture (20%), small scale sector (18.6%), agricultural labourers (18.4%), as professionals (16.5%) and in petty business (10%); other categories are very insignificant. Thus, most men have moved to higher occupations of skilled and semiskilled types in Kerala but their counterparts in other states largely follow traditional occupations with a limited occupational mobility.

For most women, household work continues to be the major avocation in all the three states. The largest percent of women in the states of Kerala (82%), A.P. (47%) and U.P. (59%) continues to follow household work. The percent of such women are more in Kerala state because women labourers are fewer in Kerala than in A.P. and U.P. Women labourers also may not report as housewives. Next to household work, the largest percent of women in A.P. (47%) work as agricultural labourers, but in U.P., only 26.5 per cent women carry out other agricultural activities.

In Kerala 9 per cent of women also work in small scale industries. Similar to Kerala women, the U.P.respondents (9.4%) work more in the small scale industrial sector but only 3 per cent of women from A.P. follow such an occupation. Class four employees among women are there in Kerala (2.6%) but they form a negligible percent in U.P. (0.4%) and A.P. (0.4%). Thus, upward occupational mobility of women is noticed in a limited way among the women in Kerala and U.P. but it is negligible in A.P. state. For the pooled data most women (64%) continue to follow the traditional work of housewife, followed by limited occupational mobility in the field of wage labour (17%), agriculture (9%), small sector (7.2%) etc., (see table 4.7).

Fertility differentials according to the occupations of the husband show a striking difference within each state and among the three states in almost all categories of jobs, except among the farmers and artisans in the states of Kerala and A.P. Such interstate differentials in fertility might also be due to occupations besides other factors: Within each state also fertility did not vary much in the U.P. and A.P. states but varied significantly between certain occupational categories in Kerala state. In Kerala fertility was lowest among the professionals (2.5), for those who went to Gulf countries (2.6) and big business people (2.7) as against the

Table 4.7: *Percent Distribution of Respondents in U.P., A.P., Kerala and India by Occupation of Husband and Wife*

Occupational categories	U.P.		A.P.		Kerala		India	
	Husband	Wife	Husband	Wife	Husband	Wife	Husband	Wife
Agricultural labourers	11.6 (232)	4.0 (79)	39.6 (792)	46.7 (934)	6.8 (170)	4.4 (110)	18.4 (1194)	17.3 (1123)
Other labourers (Beedi rolling, washermen, etc.)	17.3 (345)	9.4 (188)	7.0 (139)	3.0 (60)	29.6 (740)	8.9 (222)	18.8 (1224)	7.2 (470)
Petty business (vegetable vendors, milk maid, etc.)	9.5 (190)	0.7 (13)	7.1 (142)	1.2 (25)	12.7 (317)	2.1 (53)	10.0 (649)	1.4 (91)
Rural artisans	2.7 (54)	-	2.8 (57)	-	8.4 (211)	-	5.0 (322)	-
Cultivators	27.2 (544)	26.5 (53)	29.8 (597)	2.0 (41)	7.0 (175)	0.4 (9)	20.2 (1316)	8.9 (581)
Big business for men/ housewives (women)	1.3 (26)	59.0 (1180)	1.0 (20)	46.7 (933)	4.0 (100)	81.6 (2041)	2.2 (146)	63.9 (4154)
Class four employees	13.0 (260)	0.4 (9)	2.0 (39)	0.4 (7)	1.8 (45)	2.6 (65)	5.3 (344)	1.3 (81)
Skilled workers & professionals	16.0 (321)	-	8.0 (159)	-	23.7 (593)	-	16.5 (1073)	-
Others (working in Gulf countries)	1.4 (28)		2.7 (55)	-	6.0 (149)	-	3.6 (232)	-

Table 4.8: *Mean Live Births according to Occupation of Husband and Wife in U.P., A.P., Kerala and India*

Occupational categories	U.P.		A.P.		Kerala		India	
	Husband	Wife	Husband	Wife	Husband	Wife	Husband	Wife
Agricultural labourers	4.7	5.2	3.8	3.9	2.9	3.2	3.9 (1194)	3.9 (1123)
Other labourers (Beedi rolling, washermen, etc.)	4.3	4.5	3.5	3.7	3.1	3.4	3.5 (1224)	3.9 (470)
Petty business (vegetable vendors, milk maid, etc.)	4.5	4.5	3.6	4.8	3.1	3.8	3.6 (649)	4.2 (91)
Rural artisans	4.2	-	3.5	-	3.4	-	3.9 (322)	-
Farmers	4.2	4.2	3.1	4.0	3.0	2.0*	3.5 (1316)	4.1 (581)
Big business /housewives	4.2	4.2	3.6	3.1	2.7	2.9	3.1 (146)	3.3 (4154)
Class four employees	4.1	3.7*	3.9	3.4*	3.0	2.0	4.0 (344)	2.3 (81)
Skilled persons /professionals	4.2	-	3.4	-	2.5	-	3.2 (1073)	-
Others (working in Gulf countries)	2.7	-	3.9	-	2.6	-	2.9 (232)	-

* Sample size less than Ten.

highest fertility noticed in the rural artisans (3.4); others have an intermediate level of fertility according to the occupation of the husband. In U.P., however, fertility does not vary much with the occupation of the husband, it is highest among the agricultural labourers (4.7) and lowest among people who are working in the Gulf countries (2.7). In A.P., surprisingly, it is highest among those who have gone to the Gulf countries (3.9) and among class four employees (3.9). In A.P. mostly the Muslims work in the Gulf area and that is why this particular category is showing the highest fertility. Otherwise people who have migrated to distant places generally manifest the lowest fertility as seen in the Kerala and U.P. states. No other category of occupation has influenced the fertility decline in all the three states and also in the country at large.

Occupational categories of women showed more variations in fertility in each state and among the states. It may be because women may change their life style fast with the change in their occupation, which is rare and infrequent when compared to men. While agricultural labourers in the U.P. state showed the highest fertility (5.2), the lowest rate was noticed among the class four employees, owner agriculturists and housewives. In A.P. petty business women showed the highest fertility and housewives lowest. In Kerala it was highest among petty business women as in the case of the A.P. state and lowest among class four employees and owner agriculturists. All other categories of employment in the three states have an intermediate level of fertility between the two extreme levels cited above. The pooled data show the lowest fertility among men employed in foreign countries and class four women employees. The highest level of fertility was among class four employees and men and women employed in petty business. Because of inconsistent differentials in fertility, and the absence of a definite pattern in the influence of various occupations on fertility, one may assume that occupation *per se* does not provide much evidence to explain fertility differences within a state and among the three states. However,upward occupational mobility among women contributes significantly to fertility decline and most men migrating abroad for employment also show similar decline in fertility (Table 4.8).

5

Breastfeeding and Weaning

– K. Mahadevan & (Ms) P.R. Reddy

Breastfeeding is a major component of the several determinants of fertility behaviour according to many studies summarised by Bongaarts and Potter (1983). Its influence on fertility behaviour is due to the lactational amenorrhea period that extends or reduces with the duration of breastfeeding. However, studies from India, Egypt and Chile and from several developed countries suggest that lactational amenorrhea shortens among women who introduce supplementary feeding at an early age for the infants (Prema and Ravindranath, 1982). Since breastfeeding is almost universal in India, and initiation of breastfeeding and supplementary feeding are likely to vary in different places, breastfeeding coupled with supplementary feeding together may differentially affect the lactational amenorrhea of women in the states that we have studied. In this section certain aspects of breastfeeding are discussed, and the rest are covered under mortality section since this is equally important for both fertility and mortality. Hence an overall understanding of breastfeeding can be known in this population by going through the breastfeeding aspects discussed here and elsewhere in the Part II of this book.

Duration of Breastfeeding

As far as mean duration of breastfeeding is concerned interstate differences are not very big. The duration of breastfeeding extends up to 25.4 months in U.P. and 20.6 and 22.0 months in A.P. and Kerala respectively. Though it is longer in U.P. by 3.5 months than in the other states, such a difference does not adequately explain the high fertility of U.P. and the low fertility of Kerala. Further even with the longest duration of breastfeeding U.P. manifests the highest fertility, which means that this factor alone cannot depress very much the fertility within this state and also explain the inter-state variations in fertility. No doubt an additional 2 months of breastfeeding in Kerala and 4.8 months in U.P. compared to A.P. cannot be ignored when we take the cumulative effect of the period for the population as a whole. Added to this variable, now the reported duration of the amenorrhoea period also does not help much to explain the fertility differences within each state, though it helps to a certain extent in explaining inter-state variations. Mean duration of amenorrhoea period extends up to 11.6 months, 11.1 months and 7.9 months in U.P., A.P. and Kerala states respectively. These periods show a definite difference between U.P. and A.P. on the one side and Kerala on the other but not between the former two states. Again, Kerala with the shortest period of amenorrhoea has the lowest fertility and the other two states with longer duration of amenorrhoea have the higher fertility and hence it does not seem to explain much of the variations in intra-state and inter-state differences in fertility.

Table 5: *Percent Distribution of Respondents by Duration of Breastfeeding in U.P., A.P., Kerala and India*

Duration of Breastfeeding	U.P.	A.P.	Kerala	India
Not applicable	22.4	20.7	22.0	21.7 (1411)
1 - 6 months	4.4	5.0	3.9	4.4 (285)
7 - 12 months	11.9	19.2	15.6	15.5 (1010)
13 - 18 months	21.2	8.7	21.5	17.5 (1137)
19 - 24 months	18.3	28.7	19.3	21.9 (1422)
25 - 30 months	12.1	2.4	7.1	7.2 (469)
31 + months	9.7	15.3	10.6	11.8 (766)
Total	100.0 (2000)	100.0 (2000)	100.0 (2500)	100.0 (6500)

After four months it is observed that the majority of the respondents in all the three states continue to breastfeed their children. Only a minority resort to substitutes like animal milk or a combination of the two. The information obtained indicates that breastfeeding is popular for the first few months among the rural groups in all the three states. A WHO report on contemporary patterns of breastfeeding states that breastfeeding is more common in the rural groups surveyed in the Third World countries (1980) than in urban groups.

However, let us further examine how different duration of breastfeeding manifests across the population of these states (see table 5). Considering the duration of breastfeeding for a period of one year, one to two years and above two years, the lowest percentage of women in U.P. (16.3%) compared to that of women in A.P. (24.2%) and in Kerala (19.5) breastfeed for a period of less than one year. For those who breastfeed for one to two years period not much difference is noticed across the states of U.P. (39.5%), A.P. (37.4%) and Kerala (40.8%). However, the longest duration of over two years of breastfeeding is seen among the women of U.P. (21.8%) followed by the women of A.P. (17.7%) and Kerala (17.7%).

Table 5.1: *Percent Distribution of Respondents in U.P., A.P., Kerala by Substitute Milk given to Baby (after four months)*

Substitute milk (after four months)	U.P.	A.P.	Kerala
1. Not applicable	92.6	79.9	84.7
2. Animal milk	6.5	15.8	8.6
3. Tinned milk	0.9	2.7	3.6
4. (2) + (3)	0.7	1.6	3.1

When the frequency of breastfeeding is considered before weaning and after weaning, it is found that in the majority of the cases the frequency of feeding before weaning is high in all the three states compared to after weaning. When gradual weaning occurs, it is natural to expect a decline in the frequency of breastfeeding. The mothers tend to breastfeed their child to a greater extent in A.P. and Kerala before weaning as well as after weaning compared to the practice in U.P. This trend may be due to more women staying at home in A.P. and Kerala compared to those in U.P., who are engaged as labourers. It may also be due to a longer duration of rest taken in A.P. and Kerala after delivery. Breastfeeding is prolonged in majority of cases in U.P. up to 25 months or more. The average duration of breastfeeding almost remains the same, i.e., 1-2 years in all the three states (table not given).

Weaning Practices

Weaning has come to mean the period during which an infant gradually becomes accustomed to food other than breast milk. In many developing countries it covers the time between 6 months and about two and a half years (Cameron & Hofvander, 1983). In all the three states the majority of cases reporting introduction of semisolid foods occur at 6-7 months; the percentage values being 26.9, 64.3, 28.4, for U.P. A.P. and Kerala respectively. In the case of Kerala weaning begins as early as first month in a few cases and to the extent of 33.6 per cent during 2-3 months. In U.P. quite a number of children are weaned as late as 12 months (25.8%) while it is only 11.2 per cent and 6.7 per cent in A.P. and Kerala respectively.

Table 5.2: *Percent Distribution of Respondents in U.P., A.P., and Kerala by Age at Introduction of Semisolid Foods (Weaning)*

Age of introduction of solid foods (weaning)	U.P.	A.P.	Kerala
Not applicable	4.1	2.9	2.6
≤ 12 months	25.8	11.2	6.7
10 - 11 months	11.6	4.2	2.9
8 - 9 months	19.8	8.6	8.6
6 - 7 months	26.9	64.3	28.4
4 - 5 months	1.9	7.0	13.8
2 - 3 months	-	1.8	33.6
1 month	-	0.2	3.4

Taking together the duration of breastfeeding and commencement of supplementary feeding it can be fairly concluded that U.P. has the longest duration of breastfeeding and lactational amenorrhea because the mothers introduce the supplementary feeding very late. Therefore breastfeeding may be influencing fertility control to a certain extent more in U.P. than in the other two states. Though Kerala has the second longest duration of breastfeeding next to U.P., the period of lactational amenorrhea is shortest there because the supplementary feeding begins in Kerala much earlier than in U.P. and A.P. This may be the reason why Kerala has the shortest durarion of lactational amenorrhea. Though the early weaning practice is advantageous for the health of the infants in Kerala it minimises the importance of breastfeeding as a natural fertility control measure. The eight months duration of lactational amenorrhea in Kerala also may not contribute independently much to the reduction in fertility there, because in any case most of the women in Kerala, particularly in rural areas, remain in their parental home after delivery and therefore invariably will not be having any sexual contact. This exists to a certain extent in A.P. but not in U.P.

Determinants of Breastfeeding

We have already noticed that the mean duration of breastfeeding is not very different among the three states. It may be appropriate to see whether it varies across the other parameters. In the seven districts studied across the three states, in A.P., the longest duration of breastfeeding (21.2 months) occurs in the backward district of Kurnool while the shortest duration occurs in the developed district of Guntur (17.4 months). This trend is not observed either in U.P., or in Kerala between the backward and developed districts. The duration of breastfeeding slightly varies according to the religious and caste background of the population but there again it is statistically not significant (table not given). The Muslims in Kerala (17.3 months) and U.P. (18.6 months) have the shortest duration of breastfeeding, while in A.P. it is not so. Comparing Christians and Hindus of A.P. and Kerala, the Christians have the longest duration of breastfeeding (21.6 months) in A.P. In Kerala there is no difference between Christians and Hindus. Breastfeeding is uniformly shorter among the younger women in all the three states and longer among the older women. In Kerala it ranges from 15.9 months among the young women to 20.4 among the older women. But the range of difference is less in U.P. (18.2 to 20.5) and A.P. (18.4 to 19.9) than in Kerala (15.9 to 20.4). A negative association is noticed between the educational level of the women and the duration of breastfeeding in all the three states. The same trend is noticed among the educated and employed women when compared to the illiterate labourers who have the longest duration of breastfeeding. Parity-wise variation in the duration of breastfeeding is not noticed in U.P., but in A.P. and Kerala the duration of breastfeeding is shorter for the first two parities.

Mothers breastfeed for slightly less than 16 months for the first and second parity and from the 6th parity onwards. A positive association is noticed between the duration of breastfeeding and closed birth interval uniformly in all the states and in the country at large, which means that the duration of breastfeeding may increase the inter-birth interval. It is good for delaying the birth of future babies and for enhancing the health status of the mothers and children. The duration of breastfeeding in all the three states is influenced by the quantity of breast milk available. When the quantity of milk is sufficient or in excess, the duration of breastfeeding goes up to 23.6 months and it gets reduced to 8.8 months in the absence of sufficient milk. Therefore, proper intake of appropriate food during the lactation period is important to prolong breastfeeding.

Breastfeeding before and after Weaning

When the frequency of breastfeeding is compared before and after weaning it is observed that in all the three states the frequency of breastfeeding is clearly more before than after weaning. This is an expected trend. The number of cases feeding 6 times and above before weaning is more than that after weaning, when the frequency is within six times. When taking the frequency of whenever the baby cries, before weaning it is 37.8 per cent, 74.4 per cent and 82.1 per cent in U.P, A.P. and Kerala respectively. After weaning, the proportion of mothers feeding whenever the baby cries is highest in A.P. (74.0) followed by Kerala (62.3) and U.P. (15.7). The very low proportion of mothers in U.P., feeding whenever the baby cries must be due to the very high fertility recorded in the state and also due to the number of women engaged in labour work.

Breastfeeding and Fertility

These findings contribute only in a limited way to explain the intra - and inter-state state differences in fertility behaviour,

Table 5.3: *Mean Duration of Breastfeeding by districts in U.P, A.P., Kerala and India*

Districts	U.P.	A.P.	Kerala	India
1. Jhansi	19.2	-	-	19.2 (782)
2. Gorakhpur	19.8	-	-	19.8 (770)
3. Kurnool	-	21.2	-	21.2 (843)
4. Guntur	-	17.4	-	17.4 (744)
5. Palghat	-	-	18.7	18.7 (759)
6. Trivandrum	-	-	18.7	18.7 (811)
7. Alleppey	-	-	19.8	19.8 (380)

because the duration of different periods of breastfeeding does not significantly vary among the people in all the three states. However, breastfeeding shows a negative association with fertility in all the three states and more or less in the country as a whole for the duration beginning with one and more years of lactation. The fertility of the couple where the wife breastfed her babies for one to six months, and seven months to one year, has a somewhat inconsistent trend in different states. On an inter-state basis the fertility of U.P. women is highest (5.0) as compared to that of the women of A.P. (3.3) and of Kerala (3.0), when their women in general breastfed for a very short period of less than six months. The same level of fertility is maintained up to a duration of 18 months of breastfeeding in U.P. and then it starts declining. But in A.P. and Kerala, on the other hand, an upward trend in fertility is maintained till the end of 18 months of breastfeeding and then it starts declining though the increase in fertility is not very great from one duration of breastfeeding to the next higher levels. Among the women of the three states who breastfed their children for a long duration, i.e., from 25 months and above, however, fertility is somewhat lower, but the decline in fertility is statistically not significant between the states of A.P. and Kerala, whereas its influence is significantly higher in U.P. state. The percentage of women who take to prolonged duration of breastfeeding is not sufficient to make an impact on the overall reduction in fertility decline in any state. But, it is almost certain that prolonged breastfeeding over two years makes a certain reduction in fertility. However, no such reduction is discernible for the duration of two years or less of breastfeeding. The same trend is also noticed

Table 5.4: *Mean Live Births according to the Duration of Marriage of Mothers and their Duration of Breastfeeding (for last but one child) in U.P., A.P., Kerala and India*

Duration of breastfeeding	U.P.				A.P.				Kerala				India			
	10 years	11-20	21+	Total	10 years	11-20	21+	Total	10 years	11-20	21+	Total	10 years	11-20	21+	Total
1-6 months	3.0	5.6	6.3	5.0 (88)	2.5	3.4	5.0	3.3 (100)	2.4	3.2	4.6	3.0 (97)	2.6	4.1	5.5	3.7 (285)
7-12 months	3.0	5.0	7.0	5.0 (237)	2.7	3.7	4.7	3.6 (384)	2.4	3.6	4.9	3.2 (389)	2.6	4.0	5.4	3.8 (1010)
13-18 months	2.9	5.1	6.7	5.0 (424)	2.6	4.1	5.2	4.0 (175)	2.5	3.6	5.5	3.4 (538)	2.6	4.3	6.0	4.1 (1137)
19-24 months	2.9	4.9	6.7	4.9 (367)	2.7	4.4	5.8	4.3 (573)	2.5	3.8	5.2	3.6 (482)	2.7	4.1	6.0	4.1 (1422)
25-30 months	2.7	4.6	6.4	4.7 (242)	2.5	4.1	5.5	3.8 (49)	2.3	3.5	5.4	3.5 (178)	2.5	4.1	6.0	4.2 (469)
31+ months	2.3	4.6	6.2	4.9 (194)	2.5	3.9	5.8	4.2 (306)	2.3	3.2	4.6	3.4 (266)	2.4	3.8	5.5	4.1 (766)
Not applicable (last but one baby not alive/ not available)	1.3	3.3	4.9	2.1 (448)	1.2	2.5	3.6	1.8 (413)	1.1	1.9	2.3	2.2 (550)	1.2	2.7	4.0	1.7 (144)

among the young, middle-aged and older women in all the states (see Table 5.4). Hence, we may conclusively confirm that the duration of breastfeeding is a minor determinant of fertility decline for a limited number of respondents and it explains the inter and intra-state fertility differences in a limited extent only. But it is also a factor that explains fertility variations within U.P. and also to a certain extent between the U.P. and other two states.

6

Family Planning

– K. Mahadevan & V. Balakrishnan Nair

According to the government record the percentages of couples who are currently and effectively protected by various contraceptive methods as on March 1983, were 13.1 per cent, 28.4 per cent and 33.5 per cent in U.P, A.P. and Kerala states respectively. Out of these states only U.P. manifested a dismal performance in contraception and that too below the national average (25.9). Maharashtra (40%), Gujarat (36.9%) and Punjab (34.5%) are the only other three states which have performed better than Kerala (Govt. Year Book, 1982-83). These rates refer to the entire eligible couple and not for the couple with one child and above only as has been the case with the respondents here.

Family planning adoption levels vary across the three states. While in Kerala 65.5 per cent of the couples with one child and more have adopted one or the other methods of contraception, only 48.6 per cent of their counterparts in Andhra Pradesh and 30.0 per cent in Uttar Pradesh have done so. The rate of adoption in U.P. is only half of that in Kerala and A.P. has achieved nearly two-thirds of Kerala's figure. At the aggregate level it is almost fifty percent of adoption. When the adoption level is considered in relation to their fertility behaviour of the couples in all the three states, adopters have more children than the non-adopters; it is in excess by 0.9 child in U.P., 0.5 in A.P., 0.3 in Kerala and 0.2 at the aggregate level. Hence it is certain that contraception has not depressed much of the present level of fertility in U.P. and A.P. However, it really influenced the decline of fertility in Kerala, where an overwhelming percentage of people have adopted it and the fertility level of the adopters and non-adopters also does not differ much. The low level of Kerala's fertility is seen as a result of higher percentage of contraception and its limited use may explair the higher levels of fertility in A.P. and U.P. Of course, the present level of fertility would have gone up still further if so many people had not adopted one or the other methods of contraception even in these two states. Thus, the existing differentials in contraception among the three states explain the present inter-state variations in fertility.

Table 6: *Percent of Contraception and Mean Live Births in U.P., A.P. and Kerala and India (Pooled)*

Family planning adoption status	U.P.		A.P.		Kerala		India	
	% of contra- ception	Mean L.B	% of contra- ception	Mean L.B	% of contra- ception	Mean L.B	% of contra- ception	Mean L.B
Non-adopters	70.1 (1402)	4.0	51.4 (1029)	3.3	34.5 (864)	2.7	50.7 (3295)	3.4
Adopters	29.9 (598)	4.9	48.6 (971)	3.8	65.5 (1636)	3.0	49.3 (3205)	3.6

X^2 = 557.1 for 2 d.f. (highly significant).

Family Planning in Different Districts

When the proportion of adopters of contraception across the seven districts is considered, it is found to be highest in Trivandrum (74%), followed by the Alleppey district (73%) in Kerala. The third highest level of adoption next only to Trivandrum and Alleppey, is not Palghat district (53%) of Kerala but the Guntur district (61.4%) of A.P. Even one of the most backward districts in A.P., namely Kurnool (36.5%) has attained a higher level of contraception than the Jhansi (31.6%) and Gorakhpur districts (29.3%) of U.P. Surprisingly, the Jhansi district is slightly ahead of Gorakhpur in the overall rate of adoption. However, more young couples with two or less number of children have adopted contraception in Gorakhpur than in Jhansi. Except the slight unexpected differential adoption of contraception noticed in the two districts of U.P., in all other places the adoption level is incongruence with the level of socio-economic development of the respective districts.

In A.P., too, significantly more couples with two or less children have adopted contraception in Guntur (26.1%) and in

Kurnool (6.1). In this respect all the three Kerala districts are far ahead of most of the districts in A.P. and U.P. except the Guntur district. While 35.7 percent, and 33 percent of women with a minimum number of children (≤ 2) have adopted contraception, in the Alleppey and Trivandrum districts, which is a record in Kerala, in the same state the Palghat district (22.8%) shows a poor performance as far as demographic effectiveness of adoption of contraception is concerned. Even the Palghat district is far ahead of the Kurnool district in A.P. and all the two districts from U.P. in this regard. These findings point out the need for a rethinking in taking district as a unit for implementation of family planning in all aspects and the urgent need for periodic evaluation of the demographic effectiveness of the adopters within and across all the states in India. The findings conclusively prove that large scale adoption of contraception by couples with few children in Kerala and Guntur district in A.P. might have contributed to the low birth rates seen in these places, which has already been discussed at the beginning of this report under the section on fertility behaviour (see table 6.1 at the appendix).

Determinants of Contraception

Religion and caste-wise variations in adoption of contraception across these states are also noticed. The level of adoption of contraception is lowest for the Muslims, followed by the Christians and it is highest among the Hindus. However, all these communities also manifest inter-state variations in contraception. While Muslims in U.P. have the lowest level (22.9%) of adoption of contraception, those in A.P. have an intermediate position and in Kerala, Muslims manifest the highest level (53.6%). The rate of adoption among Kerala Muslims is thus higher than that in all the other communities in A.P. and U.P. taken together. Similar is the case of the Christians in Kerala (65.8%). The level of adoption of the Hindus is 32 percent in U.P., 53 percent in A.P. and 73 percent in Kerala. When we control the number of children it is seen generally that a higher percentage of the couple adopted contraception with three or more children than those with two or less irrespective of the other factors (see table 6.2 at the appendix). This means that it is not the religion *per se* that makes the Muslims lag behind in adopting contraception. There may be other variables like educational differences which could be a major factor explaining the differences in levels of adoption of contraception.

The forward castes all over India except in Kerala rank first in the level of adoption of contraception. The backward castes in U.P. and Kerala have adopted less contraception compared to the scheduled castes and tribes (SC & ST) but it is still more than the rate of adoption of contraception by the Muslims and the Christians put together. The SC and ST rank first in contraception in Kerala and their rate is very close to that of the forward castes. This is perhaps the major unexpected factor in the low birth rate seen among the SC and ST in Kerala state (see chapter on Demography). Another interesting feature is that when the number of children is controlled more women with three or more children in U.P. and A.P. states (i.e., almost four to five times) have adopted contraception as against women with two or less number of children. However, in Kerala only a negligible difference in adoption is noticed in the number of children of the eligible couple. But among the forward castes, surprisingly more couples with two and less number of children have adopted than those with three of more. It is thus clear that large-scale adoption of contraception by low parity couples in Kerala has contributed to the rapid decline in her fertility. This factor therefore acts as a major determinant of differential fertility between Kerala and the other two states. Since most of the adopters in U.P. and A.P. have three or more children, contraception as a factor does not make any major impact on their fertility decline. Hence the future promotion of family planning may have to take this aspect seriously. The findings also provide further clues to the need for concentrating more efforts among the Muslims, SC, ST and backward castes in states like U.P. & A.P., since they lag behind in the adoption of family planning (see table 6.3 at the appendix).

Education invariably shows a direct relationship with contraception in most of the states, at the aggregate level and even when the number of children is controlled. The trend is more pronounced in Kerala and A.P. than in U.P. for obvious reasons. The rate of adoption among illiterates significantly varies across the three states; it is as low as 29 percent in U.P. and somewhat high in A.P. (38.4%) and the highest in Kerala (47.6%). These findings give one more clue that greater inputs and efforts are to be made in U.P. and A.P. states among the illiterate population, who constitute more than three-fourth of the total population of these states. When the number of children are controlled, significantly greater number of illiterates with three or more children are adopters compared to the literates. In U.P., education even at the secondary school level did not make much impact in developing the small family norm but the impact is visible among the women who have had college education. On the other hand, in A.P. and Kerala, education has really developed the small family norm and consequently more women with two or less children have adopted contraception. In Kerala, significantly more couples with secondary level of education and above possessing two or less children have adopted contraception than those with three or more children. Similar trend is noticed for the educational attainment of the husbands in all the three states and at the aggregate level (see table 6.4 in the appendix).

Economic Status: Economic status manifests a consistently direct relationship with contraception in all the three states, irrespective of the number of children that the couple had at the time of adoption of contraception. The findings in all the states and at the aggregate level are consistent which is very rare when the income variable is correlated with the contraceptive practice. While the percentages of increase in contraception more or less remain the same in U.P. and A.P., it is almost double in Kerala state. While in U.P. and A.P. significantly more couple with three and more children have adopted contraception, in Kerala the same trend is found only up to the income category of Rs. 17,000 or less per annum. Among the still higher income brackets, the trend is reversed in favour of a low parity with two or less number of children. Comparing the same trend in the three states, while the least percent of couple with two or less children have adopted contraception in all the income groups in U.P. state, the percentage in A.P. is still higher and it is highest in Kerala. Such findings further confirm the greater demographic effectiveness of contraception in Kerala than in A.P. or U.P. states. Further, the demographic effectiveness of contraception is greater among the higher income categories in all the states but its percentage is particularly high in Kerala state. Therefore, income per se has contributed significantly to explain the differential acceptance of contraception within each state and between all the three states. Through the impact of income and contraception the existing fertility differences in these states can also be explained to a certain extent (see table 6.5 at the appendix).

Age at Marriage: Age at marriage of wives has a direct relationship with the acceptance of contraception. When age at marriage goes up girls will have opportunities to be educated and or to learn about the adverse consequences of a large family through informal education. The same trend is noticed in all the states, irrespective of the number of living children. Here again the value of son and family size norm can be considered as a parallel determinant of contraception. That is why in all the states, except in Kerala, the level of adoption of contraception is greater among couples with three or more children; the fact that education, income and age at marriage also increase the rate of adoption cannot be ignored here. The level of adoption significantly varies across the states when the age at marriage increases; it is 39 percent in U.P, 61.3 percent in A.P. and 66.3 percent in Kerala and 65 percent at the aggregate level among the women who married at 18 years and above. For those who married at 13 years and lower the rate of adoption of contraception is relatively less, 30.7 percent in U.P, 40 percent in A.P. and 51.9 percent in Kerala and 34 percent at the aggregate level. Therefore, increasing age at marriage may contribute to greater acceptance of contraception (table not given).

Value of Sons: The value of sons in terms of the number of sons living showed a direct relationship with the acceptance of contraception in all the three states and at the aggregate level. The trend is consistent and pronounced for couples with three or more living children and inconsistent for couple with two or less number of children in all the states and at the aggregate level (see table 6.6). The findings from this table confirms the hypothesis that without attaining the optimum number of son(s), the couple did not accept contraception. However, the couples differ in Kerala from those of the other two states with regard to the desire for one or more number of sons. In Kerala the desire is confirmed mostly to one son but in A.P. and U.P., it goes beyond this. The table reveals that the number of couples adopting contraception steeply declines in Kerala after getting the second son but it is not so in A.P. and U.P. states. The same findings have been reported in another recent study (Mahadevan and Sumangala, 1987).

Cost of Marriage: Marriage of the girls cost parents a lot nowadays. No doubt it is higher for the middle and upper

Table 6.6 : *Percent Distribution of Family Planning Adoption Status according to Number of Living Children by Number of Male Living Children in U.P., A.P., Kerala and India*

Number of male living children	U.P.			A.P.			Kerala			India		
	≤ 2 Adoption	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption
No male living child	8.4 (25)	3.0 (9)	11.4 (34)	12.8 (42)	7.9 (28)	20.7 (68)	38.7 (204)	13.1 (69)	51.8 (273)	23.5 (271)	9.0 (104)	32.5 (375)
One male child	7.8 (46)	12.6 (74)	20.4 (120)	24.5 (195)	24.2 (193)	48.7 (388)	40.3 (403)	25.4 (254)	65.7 (657)	27.0 (644)	21.9 (521)	48.9 (1165)
Two male children	3.2 (18)	35.8 (205)	39.0 (223)	15.8 (82)	44.8 (232)	60.6 (314)	20.2 (128)	55.3 (351)	75.5 (479)	13.2 (228)	45.7 (788)	58.9 (1016)
Three + male children	-	43.6 (221)	43.6 (221)	-	58.9 (201)	58.9 (201)	-	67.4 (227)	67.4 (227)	-	54.8 (649)	54.8 (649)

Table 6.7: *Percent Distribution of Respondents and Family Planning Adoption Status according to Number of Living Children by Total Expenditure for Daughters' Marriage in U.P., A.P., Kerala and India*

Total expenditure for daughters marriage	U.P.			A.P.			Kerala			India		
	≤2 Adoption	3+ Adoption	Total Adoption	≤2 Adoption	3+ Adoption	Total Adoption	≤2 Adoption	3+ Adoption	Total Adoption	≤2 Adoption	3+ Adoption	Total Adoption
Not applicable	4.8 (80)	23.6 (392)	28.4 (472)	17.1 (306)	31.4 (561)	48.5 (867)	29.5 (541)	39.7 (727)	69.2 (1268)	17.6 (927)	31.9 (1680)	49.5 (2607)
≤ 10,000	2.5 (6)	36.1 (87)	38.6 (93)	5.5 (8)	41.4 (60)	46.9 (68)	19.9 (34)	23.9 (41)	43.8 (75)	8.6 (48)	33.8 (188)	42.4 (236)
10001-20000	2.5 (1)	42.5 (17)	45.0 (18)	15.8 (3)	42.1 (8)	57.9 (11)	26.1 (47)	20.6 (37)	46.7 (84)	21.3 (51)	25.9 (62)	47.3 (113)
20001-30000	6.7 (1)	66.7 (10)	73.4 (11)	7.1 (1)	64.3 (9)	71.4 (10)	25.0 (31)	29.0 (36)	54.0 (67)	21.6 (33)	36.0 (55)	57.5 (88)
30,001 +	10.0 (1)	30.0 (3)	40.0 (4)	5.3 (1)	73.7 (14)	79.0 (15)	43.2 (82)	31.6 (60)	74.8 (142)	38.4 (84)	35.2 (77)	73.6 (161)

caste/class population and lower among the poor people. It is difficult for the poor people to meet even the low costs. The expenditure for marriage consists of cash given in the form of dowry, cost of ornaments and expenses incurred for celebrating the marriage. Interestingly the total cost of marriage of girls emerged as a major factor influencing contraception, showing a direct relationship with contraception in all the three states and at the aggregate level. But the relationship is seen only with parents who have already three and more living children but not for those with two or less children. This is because the difficulty of arranging marriages will be less with one or two children but more when there are three and more children to be married off. Therefore, the escalating cost of marriage would continue as a factor for strengthening family planning, though it is not a desirable social development (see table 6.7).

A few major factors that are responsible for the inter-state and intra-state variations in the acceptance of family planning have been delineated. The development disparities in the districts within and between the states and religious and caste-wise differences resulting out of the variations in values, beliefs, and norms are the general associated factors. In fact value of son(s) is greater in the U.P. and A.P. states but the same is much less in Kerala state. Differences in age at marriage of girls also contribute to variations in acceptance as seen between Kerala with high age at marriage and the other two states with relatively low levels of age at marriage. Educational differences form yet another major determinant of differential acceptance of contraception both within and across the three states. Economic status and costs of conducting marriages have shown a consistent and direct relationship with contraception. In short, one can conclude that a combination of cultural and socio-economic factors together influence the contraceptive acceptance within and across all the three states.

Incentives and Contraceptive Behaviour

Incentives are extensively desired by eligible couples (mothers in particular) in all the three states with significant variations in the amount they prefer within and across the three states. While an overwhelming proportion of mothers in A.P. (70%) desired different levels of cash incentives, significantly fewer mothers in U.P. (54%) and Kerala (55%), felt this way. It is surprising to find the

Table 6.8: *Percent Distribution of Respondents according to Family Planning and Adoption Status and Ideal Monetary Incentives desired in U.P., A.P., Kerala and India*

Monetary Incentives	U.P.			A.P.			Kerala			India		
	N.A.	A	Total	N.A.	A	Total	N.A.	A	Total	N.A.	A	Total
No need	46.4	46.2	46.3	30.6	29.1	29.9	58.0	38.0	44.9	44.5	36.8	40.7
	(634)	(276)	(910)	(310)	(283)	(593)	(500)	(621)	(1121)	(1444)	(1180)	(2624)
≤ 200 Govt. wish	0.2	0.3	0.3	30.5	37.0	33.7	5.8	11.1	9.2	11.2	16.9	14.0
	(3)	(2)	(5)	(309)	(359)	(668)	(50)	(181)	(231)	(362)	(542)	(904)
201 - 400	3.0	1.3	2.5	19.9	22.7	21.2	13.6	19.9	17.7	11.1	17.3	14.2
	(41)	(8)	(49)	(202)	(220)	(422)	(117)	(326)	(443)	(360)	(554)	(914)
401 - 600	14.7	7.0	12.4	12.3	7.4	9.9	21.5	30.0	27.1	15.8	18.9	17.3
	(201)	(42)	(243)	(125)	(72)	(197)	(185)	(491)	(676)	(511)	(605)	(1116)
601 +	35.7	45.2	38.5	6.7	3.8	5.3	1.1	1.0	1.1	17.4	10.1	13.8
	(487)	(270)	(757)	(68)	(37)	(105)	(10)	(17)	(27)	(565)	(324)	(889)
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	(1366)	(598)	(1964)	(1014)	(1971)	(1985)	(862)	(1636)	(2498)	(3242)	(3205)	(6447)

Note: No living child cases deleted, i.e., in U.P. 36; A.P. 1.5 & Kerala 2.

mothers in U.P. and Kerala feeling the same. However, the quantum of incentives desired significantly differs even among the mothers within and across the three states. Those who desire a cash incentive of Rs. 601 and above constitute the highest proportion in U.P. (38.5%) as against a negligible percentage in A.P. (5.3%) and Kerala (1.1%). At the aggregate level also 13.8 percent of couples desire similar incentives.

The opinion of the adopters show an extreme situation in U.P. with 46 percent of them not bothering about incentives and another 45 percent desiring an incentive of Rs. 601 and even more for acceptance of sterilization. In A.P. the incentive shows an inverse relationship with contraception. There is an inconsistent trend in Kerala; however, in Kerala the single largest proportion (30%) desire an incentive range of Rs. 400-600. A similar situation is noticed among the non-adopters in U.P. and A.P. but in Kerala the single largest group of non-adopters (58%) does not want/bother about incentives and the rest only want incentive of Rs. 200-600 range. On the other hand, in U.P., 54 percent and in A.P. 69 percent of women among non-adopters want an incentive range of Rs. 200-600 for accepting contraception in future. Compared to U.P. most women in A.P. want a lower amount of Rs. 200-400 and U.P. respondents desire mostly Rs. 400 and above. All these differential findings on the quantum of monetary incentives may be considered to provide incentives in future in the different states to attract more and more eligible couples to accept contraception (see Table 6.8)

Opportunity Cost and Contraception

A few selected dimensions of opportunity costs have been posted to the respondents for their opinion in order to find out how far these opportunity costs vary among the mothers of these states and to what extent such of those costs have contributed to the acceptance or rejection of contraception. The items considered here have been listed under the chapter on socio-economic status and fertility. Here they are taken together and made an index to ascertain their combined influence on contraceptive behaviour. Based on the scores that the respondents obtained on the index of opportunity cost, they have been classified into low, medium and upper categoreis in terms of their preference on various dimensions of this cost.

Opportunity cost in general shows a direct relationship with acceptance of family planning in U.P. and Kerala but the same trend is seen only partially in A.P. Hoewever, mothers with three and more living children a definite and uniform positive association is noticed between the opportunity cost and acceptance of contraception in all the three states and also at the aggregate level. But such a pronounced trend is not there with mothers in all the three places having two living children and adopting contraception. Therefore various opportunity costs together or one or the other dimensions of the cost significantly influence women in particular to get a higher level of motivation leading to contracepation (see table 6.9 at the appendix).

Age and Duration of Married Life and Contraception

It is assumed that couples with three or more number of living children and with older ages are likely to accept contraception more readily than the low parity and young women. When the age of the respondent and duration of married life have been separately cross-tabulated with acceptance of contraception controlling the number of living children certain interesting findings emerged.

The age of the respondents shows a direct relationship with contraception in all the three states and also at the aggregate level, when they have three and more living children but it shows a somewhat inverse relationship with two or less children. Women, who have adopted contraception with three and more children and aged 35 and above, are much more in Kerala (75%) than in U.P. (42%) and A.P. has an intermediate level (52%). A similar trend is seen among women aged 25-34 with three and more children (but in this case A.P. is ahead of Kerala) and also among younger women ($\leq$24) with three and more children. Adopters with two and less children are negligible in U.P. but they are substantial in A.P. and more numerous in Kerala (table not given). Hence in demographic effectiveness of contraception, the largest proportion of young and middle-aged women have adopted contraception in Kerala, followed by A.P. and U.P.

As in the case of age, the duration of married life also shows a direct relationship with contraception in U.P. and A.P. and a curvilinear relationship in Kerala. While the proportion of adopters with 21 or more years of reproductive period with three and more number of children constitute only 44 percent in U.P.; they are significantly more in A.P. (51 percent) and Kerala (59 percent) than in U.P. with regard to the demographically more effective (i.e., with 20 years of duration) adopters they are more in Kerala (54%) at an intermediate level in A.P. (41%) and a much lower level in U.P. (31%). Adoption of contraception by the young couples (10 years of duration)' is still less in proportion in U.P. (5.9%) than in A.P. (10.9%) and Kerala (17%). The proportion of adopters with two or less children adopted contraception is at a highly significant level in Kerala (25 - 38.5). They have 20 or less years of reproductive period, and are demographically more effective. Next comes A.P. (17 - 18%) and last U.P. (3 - 9%). All these findings thus reveal that demographically effective adopters are indeed very high in Kerala, moderate in A.P. and very poor in U.P. (table not given).

7

Determinants of Completed Fertility

– K. Mahadevan & M. Sumangala

Women aged 35 years and above, who normally would have reached the tail end of their reproductive life, have been considered for a special analysis in order to identify a selected few determinants of their completed fertility differentials across the three states. According to the age-specific fertility rates, women of Kerala would have almost stopped their family formation by their 35th year, but in U.P. and A.P., they have only reduced the high fertility behaviour at this age. However, not much addition to fertility is expected after the age of 35. Hence this analysis might throw some more light on the major determinants of differential fertility across the three states.

Table 7 shows greater differential fertility across the three states, for the older women aged 35 and above than the younger persons ($\leq$ 35 years). The mean number of live births for the 35 and above aged group in U.P., A.P. and Kerala are 6.2, 5.1 and 4.2 respectively and 5.1 for the pooled data. The differences in fertility between U.P. and A.P. accounted for 1.1 child, U.P. and Kerala 2 children and A.P. and Kerala 0.9 child. But the fertility differences of the young couple across the three states is significantly less as compared to the fertility rates seen among the older women. It was only 0.4 between the U.P. and A.P. 1.1 between the U.P. and Kerala and 0.7 between the A.P. and Kerala. Thus the fertility differences of the older couple make very high fertility differences across all the three states. The inter-state fertility differences for the older and younger couples are greater between U.P. and Kerala and much less between U.P. and A.P., and A.P. and Kerala. A few selected determinants of fertility of the older couples are examined here.

Table 7: *Differential Fertility of the Younger and Old Couple in the Three States and India*

Age of Women	U.P.	A.P.	Kerala	India
≤ 34 years	3.4	3.0	2.3	2.9 (4598)
35 + years	6.2	5.1	4.2	5.1 (1902)

Religion, Caste and Fertility

In U.P. state the fertility behaviour of older couple across the different religious and caste groups manifests only a restricted differences between the Muslims on the one side and the backward and forward caste Hindus on the other, but not between the former group and the scheduled caste and tribes (SC & ST) population. Within the Hindus it varied significantly between the SC and ST with both the backward (BC) and forward caste (FC) population but not between the BC and FC. The overall fertility of all the committees exceeds 6 children and it ranges from 6.1 to 6.5 live births.

In A.P., fertility varied much more across the various religious and caste groups. The range of rates between the high and low fertility for the Muslims and the forward castes is 3.9 to 6.8, unlike in U.P. Fertility differed across all the religious and caste groups in A.P. It is highest for the Muslims (6.8) followed by SC & ST (6.4), Christians (6.1), BC (5.4) and FC (3.9) in this descending order. Comparison of fertility between the A.P. and U.P. across the religious and caste groups showed a significant difference. Muslims in A.P. show the highest fertility of 6.8 compared to their counterparts in the U.P. state (6.5). Interestingly the SC and ST of both the states have similar fertility of 6.4 children. But the BC (5.4) and FC (3.9) of A.P. have lower fertility as compared to their counterparts in the U.P. state (i.e., 6.1 each). In Kerala all the religious and caste groups manifest lower fertility.

In Kerala also variations in fertility across different religious and caste groups are noticed. It is highest among the Muslims (5.6) followed by the Christians (4.3), BC (4.2), SC & ST (4.1) and the least among the FC (3.1) in descending order. A comparison of Kerala's fertility with that of the U.P. and A.P. states shows that the fertility of all the religious and caste groups in Kerala is significantly lower than that of their counterparts in the U.P. and A.P. states. The differences are more among the U.P. than the A.P. groups except among the Muslims. Interestingly the SC & ST in Kerala have a slightiy lower fertility than the BC, which is not the case in the other two states where they have similar and second highest fertility, next only to the Muslims. In the Kerala state as in the case of the Muslims in the U.P. and A.P. states, the Muslims have the highest fertility (5.6) which is again significantly lower than the fertility of the Muslims from A.P.(6.8) and U.P. (6.5). The Kerala Christians (4.6) have again lower fertility than their A.P. counterparts.

Certain common features noticed across the religious and caste groups in the three states are the following. Uniformly Muslims have the highest fertility in all the places but with significant variations among all the states and it ranges from 5.6 in Kerala to 6.5 in U.P. and 6.8 in A.P. The FC has the lowest fertility in all the three states and the second lowest rate is seen among the BC. Such a uniform trend is not there among the Christians, and SC & ST groups. They have the second highest rates in the U.P. and A.P. states but only the fourth level, next only to the FC in the Kerala state. Christians have the second highest level of fertility in the A.P. and Kerala states. If the fertility of the Muslims, Christians, SC, ST, BC and FC are very much closer to each other in the three states, religion and caste would not have been the major determinants of the inter-state variations in fertility. Such a trend is noticed more or less in the Muslims and SC and ST but not in the other communities. Therefore, inter-state fertility differences noticed among the three states might be largely due to the differential socio-economic and other changes that have taken place differently among these communities in all the three states. However, it does not rule out the cultural influence of these communities *per se* as seen in the case of the Muslims and SC and ST. But the SC and ST of Kerala have the lowest fertility next only to the FC, which reveals the tremendous social development and modernization that have gone into their culture. Otherwise they should have manifested a uniformly higher level of fertility like their counterparts in the A.P. and U.P. states. The same arguments applies to the differences in fertility noticed across all the three states among the BC and FC. Thus, we may conclude that though certain cultural values, norms, beliefs, customs, and sanctions, besides social backwardness are operating for high fertility among the Muslims, the Christians and the BC and SC, differential socio-economic development among these communities and more so among BC and FC are together responsible for the existing differential fertility across most of the communities in these states. Since the impact of the socio-economic development varied among the three states the fertility of BC and FC also significantly differed among these states. Otherwise they should have showed a similar trend in fertility in the three states (see Table 7).

Value of Children: Selected three dimensions of the value of children in relation of fertility behaviour are presented in Table 7.2. They are (1) sons are important to perform rites and rituals; (2) they are important to give physical support to the parents and (3) they are essential for old age security. The importance of these cultural, physical and economic factors is that they significantly influence the increase in fertility in all the states and the country at large. However, the cultural variables does not show any difference in fertility in Kerala only, which might be, as seen earlier in the chapter on culture and fertility, due to the impact of widespread higher education among women in Kerala. Nevertheless, it can be fully confirmed that the value of sons as a major pro-natalist factor all over India. However, apart from the value of children, certian other factors also contribute to the inter-state variations in fertility. Even the women who subscribed to the importance of the value of children manifest significant fertility differences in all the three states; it is highest in U.P., followed by A.P. and the least in Kerala. But fertility differences among women in these states, are much less and the lowest in certain cases for the women who did not bother about the value of sons and consequently manifested low fertility; their number is very low in U.P. and A.P. but high in Kerala. Therefore, the inter-state fertility differences are definitely due to the lower value for sons in Kerala and their greater value in the states of U.P. and A.P. Thus, this factor explains both intra and inter-state variations in fertility behaviour of the population. At the aggregate level also this factor influences fertility differences on all the three dimensions of value of children. The implication of this finding is that if the value of sons is reduced by substituting other social security measures and by promoting universal higher

Table 7.1: *Mean Live Births among Women aged 35 Years and Above according to Religion and Caste in U.P., A.P., Kerala and India*

Caste	U.P.				A.P.				Kerala				India			
	Muslims	Christian	Hindus	Total	Muslims	Christian	Hindus	Total	Muslims	Christian	Hindus	Total	Muslims	Christian	Hindus	Total
Not applicable (Muslims & Christians)	6.5	-	-	6.5	6.8	6.1	-	6.5	5.6	4.3	-	4.8	6.2	4.6	-	5.5 (451)
SC / ST	-	-	6.4	6.4	-	-	6.4	6.4	-	-	4.1	4.1	-	-	5.8	5.8 (363)
BC	-	-	6.1	6.1	-	-	5.4	5.4	-	-	4.2	4.2	-	-	5.1	5.1 (564)
FC	-	-	6.1	6.1	-	-	3.9	3.9	-	-	3.1	3.1	-	-	4.2	4.2 (524)

education among girls as seen in Kerala, fertility would be drastically fall all over India.

Table 7.2: *Mean Live Births among Women Aged 35 Years and Above according to Value Dimensions in U.P., A.P., Kerala and India*

Value dimension	U.P.		A.P.		Kerala		India	
	Yes	No	Yes	No	Yes	No	Yes	No
For fulfilling cultural rites, rituals, etc.	6.3	4.5	5.4	3.9	4.2	4.2	5.5 (1335)	4.2 (567)
For staying with parents during the old age	6.2	5.7	5.3	3.6	4.2	3.6	5.2 (1750)	3.6 (152)
Essential to get help during old age	6.3	5.7	5.9	4.2	4.8	3.6	5.7 (1197)	4.0 (705)

Educational Status: Table 7.3 (given at the appendix) discusses the educational status of older women in relation to fertility behaviour. As seen earlier in chapter four, 85.6 percent, 69.6 percent and 13 percent of women in the states of U.P., A.P. and Kerala respectively and 52.7 percent of women for the pooled data in the country as a whole are illiterates. The data reveals the extreme differences in literacy rates among women with Kerala showing the highest level of literacy rates (87%) followed by A.P. (30.1%) and U.P. (14.4%) state. But when we take the older women of these states and examine their literacy level, we see significant differences in the level of literacy within U.P. (7.9%) but not in A.P. (34.3%) and Kerala (80.2%), compared to their general population. Therefore, prevalence of an overwhelming percentage of illiterate older women (92%) seen in U.P. might have contributed to the highest level of fertility of 6.3 children in that state as against only 5.8 live births for the 65.7 percent of illiterate women population in A.P. and 5.4 children to negligible illiterate women (19.8%) in Kerala. Interestingly, fertility differences among the illiterates of A.P. and Kerala do not differ much (0.4) but it definitely varies (1 per cent level) between U.P. and Kerala. Since the illiterate women in U.P. and A.P. are more (92 % and 66 % respectively), they contribute to the high fertility of these two states. Since such women are negligible in Kerala (19.8 %) the overall fertility of Kerala is very low compared to the other two states.

Even for older women, the educational level reveals a strong and consistent negative association with fertility. Among the highest educated women also fertility varies across the states of U.P. (4.0), A.P. (3.5) and Kerala (2.4). These differences are more pronounced across the states than the fertility differences of the vast illiterate population. Hence we may confirm that the very high percentage of literate women with lowest fertility noticed in Kerala as against an overwhelming percentage of illiterate women in U.P. and A.P. with very high fertility contributes to the very high interstate fertility differences.

Age at Marriage: Age at marriage of the older couples does not uniformly and consistently reveal a negative association with fertility behaviour across the different communities and states of U.P. and A.P. as seen in the case of general population. However, in Kerala the negative association is more or less uniformly seen among all the communities. It raises the doubt about the influence of age at marriage *per se* on fertility differentials. Although older women of the U.P. and A.P. states are, by and large, illiterates, the women in Kerala are not so. Therefore, the influence of formal and informal education, the opportunity to develop a sense of responsibility that they get during the unmarried period and the idea of planning in life that goes with education make the women who marry late choose a small family. Otherwise the same negative association would have been noticed in the U.P. and A.P. states as seen in the state of Kerala. Since age at marriage shows a negative association with fertility only in Kerala and not in U.P. and A.P. (except among the Hindus in A.P.) it confirms the differential influence on fertility between the former state with the other states. Hence it explains the existing fertility differences notice between Kerala on the one side and the U.P. and A.P. on the other.

Religion-wise also, age at marriage of older women shows a certain association with fertility within and among the three states at all levels. In U.P., among the different ages at marriage, not much fertility difference is noticed between the Muslims and the Hindus among the older women. Therefore, the present fertility differences seen between them in U.P. might be due to the Hindus alone developing the small family norm. In A.P. the negative association is exceptionally seen only among the Hindus. Their fertility is lower at all levels of age at marriage than that of the Muslims and the Christians. Between the Muslims and the Christians, the former by and large manifest a significantly higher fertility at all levels of age at marriage than the Christians. In Kerala and A.P. the same trend is noticed. The Muslims nave the highest level of fertility, followed by the Christians and Hindus. However, the fertility of the Muslims and the Christians in Kerala is significantly lower compared to that of their sisters in U.P. and A.P. But such a consistent difference in fertility is not seen between the Muslims of the U.P. and A.P. states. Regarding the Hindus, the U.P. women have the highest level of fertility followed by those of A.P. and Kerala. The religion-wise fertility differences are seen at the national level also with a more pronounced negative association between age at marriage and fertility. Thus, it is certain that beyond age at marriage, fertility differences exist for the women of different religious groups and ecological regions. This might be due to the cultural values, norms and beliefs of these groups which persist differentially among the older couples. Of course, it is already known that the differential education of women within and across the states shows definite influence for the existing fertility differences of the people on the basis of religion and regions (Table not given).

Replacement Effect and Survival Insurance

The older women, who have almost completed fertility and probably experienced a certain extent of infant/child mortality in the past, were asked to give their opinion on the need for extra children for the sole purpose of replacing the deceased one and also for getting extra children in order to assure the survival chances of an optimum number of children. The findings have been presented in Table 7.5, 7.6 and 7.7. They show interesting, consistent and fairly uniform responses all over the states.

Table 7.4 (given at the appendix) confirms that in all the three states and also in the country at large the older women do subscribe to the idea of the importance of 'replacement effect'. Its influence on their fertility is manifested at a very high level. The fertility no doubt again varies across different communities and regions. In most cases the difference is more than one child. Such a significant difference in fertility is seen among all the religious groups and in all the states. The extent of increase in fertility under the influence of this factor is relatively less among the Hindus in Kerala and the Christians in A.P. However, in the country at large, the differences in fertility are equally high among all the communities and for the population as a whole.

The influence of "survival insurance" shows an equally significant increase in fertility wherever the mothers subscribed to such ideas among all the communities, regions and the country at large. But the extent of the increase in fertility under the influence of this factor is found to be somewhat less in the population as a whole in U.P. but very important in A.P. and Kerala. It does not make any other variations in its influence on fertility by religion and regions in India. Interestingly, the variations among the Muslims, the Christians and the Hindus in the three states narrow down to an often insignificant level. Hence it may be taken as the most important determinant of high fertility for the older women. Thus, "survival insurance" acts as a major pronatalist factor throughout India for the women who have completed their fertility. It is, therefore, as important as the replacement effect, because mortality in the past was fairly high in all the states, of course, with substantial inter-state differences (see Table 7.5 at the appendix).

The preceding findings are further supported by the data given in Table 7.6 (given at the appendix) on the number of babies who died in relation to the fertility behaviour. A consistent and pronounced direct relationship is observed between the number of babies who died and the mean live births in all the communities, states and the country as a whole. When no baby died the fertility difference between states of U.P. and Kerala is surprisingly small. However, a relatively significant difference in fertility exists between U.P. on the one side and A.P. and Kerala on the other. The same variation is noticed between the Muslims, the Christians and the Hindus of the U.P. state with the other two states. However, within each state significant religious variations in fertility still exist even without the experience of mortality in most cases. When mortality experience begins with one or more babies, fertility steeply increase after the death of one baby. Therefore, it cannot be argued that high fertility contributes to high mortality. Surprisingly, the inter-state fertility differences narrow down to a minimum level in all the regions when the women experienced two or more deaths of babies and it similarly declines between the same religious groups of all the three states. But inter-religious differences in fertility still persist between the two extreme states. Hence there are other factors which contribute to the religious and region-wise differences in fertility across these states and the country in general.

Contraception and Breastfeeding

Contraception and breastfeeding have shown a very low influence on the inter-state and intra-state variations in fertility behaviour except with respect to Kerala on contraception. Compared to the latter factor the former has shown more relevance in this regard in all the states. Information on contraception is given in Table 7.7, but the table on breastfeeding is not given because it does not show any definite trend of variations by state, religion and region. This is due to the universal prevalence of breastfeeding without much difference across this population.

Table 7.7 confirms (given at the appendix) that most people who adopted permanent methods of contraception achieved significantly lower fertility in all the three states and in the country as a whole. But such a uniform trend is not noticed across different religious groups within each state. However, barring the Muslims in U.P., in all other places and in all the communities, adopters of sterilization showed less fertility than the non-adopters. Such a difference is not there among the negligible adopters of temporary contraception among most of the religious groups except in Kerala. In fact they should have got much less fertility since the temporary contraception is for spacing. If they had not adopted their fertility would have perhaps equalled that of the non-adopters. The difference of their fertility range from 0.2 child to 1.4 and the difference is less in U.P. (0.2), medium in Kerala (0.9) and maximum in the state of A.P. (1.4). At the national level it is only 0.6 child. Hence, as a result of contraception the birth of so many babies would have been averted in these states among the older women. Considering the overall low fertility of the adopters, it can be said that contraception has controlled the fertility even among the older couples throughout India in a limited way.

Fertility differences among the non-adopters are the same between the population of U.P. and A.P. states but not in Kerala. However, among the adopters, they vary more across all the three states. Irrespective of adoption or non-adoption they vary among most of the religious groups within each state and among the same religious groups across the three states. Hence, they do not explain the inter-state or intra-state and inter-religious variations in fertility except that the adopters of both temporary and permanent contraception show the lowest fertility in Kerala. Thus, extensive contraception seen among the women in Kerala is a major factor for the low fertility prevailing in that state, compared to the rest of India.

Thus, it is fully conformed that fertility differences across the three states are significantly more among the older women aged 35 years and above than the younger (≤ 35) between any two states of U.P., A.P. and Kerala. The overall fertility of all the communities ranges from 6.1 to 6.5 children in the U.P., 3.9 to 6.5 in A.P., 3.1 to 4.2 in Kerala and 4.2 to 5.8 for the country as a whole. Fertility is highest among the Muslims in U.P. and A.P. and the BC in Kerala. It is lowest for FC in all the states and others have an intermediate level of fertility. However, in the country as a whole, SC and ST have the highest level and FC have the lowest rates. Among the nine important determinants of fertility chosen here, viz., religions and caste, value of children, educational status of the wives, age at marriage, repalcement effect, survival insurance, contraception and breastfeeding only five factors, namely, religion and caste, value of children, educational status of the wives and infant and childhood mortality have shown a significant relationship with fertility at all levels. Contraception has shown exclusive importance in depressing fertility in Kerala state. All other factors are not prominent enough to explain the variations in fertility, though some of them and even other factors that are not considered here also have certain influence, either directly or indirectly, on fertility differences of old age cohorts of women (35+ years).

8

Path Analysis

– K. Mahadevan, S. Shivaraju & M. Sumangala

To establish a causal relationship between fertility and other selected eleven cultural, socio-economic, demographic, programme variables and also the interaction with mortality and family planning variables, path analysis has been applied by using the zero-order correlation matrix for data from the three states under study. Path analysis is chosen out of the existing different types of multivariate analysis, viz., Multiple regression analysis, Factor analysis, etc., because it has certain advantages over the other methods. The advantages would be to measure the direct and indirect effects of the independent variables on the dependent variable, besides giving a holistic visual understanding of the inter-relationship between the various causal factors operating on the dependent variable.

Path Analysis Technique

The main principle of path analysis is that any correlation coefficient between two variables, or gross or overall measure of empirical relationship can be decomposed into a series of paths. Path analysis is a standardised multiple regression technique in which a chain relationship among the variables arranged in an orderly manner, is examined through a series of regression analysis. Each dependent variable in this analysis is regarded as determined by the variables preceding it in the path diagram. It is assumed that the set of variables considered in the path analysis is linearly additive and a symmetrical relationship exists among the variables.

Path Model for Fertility Data

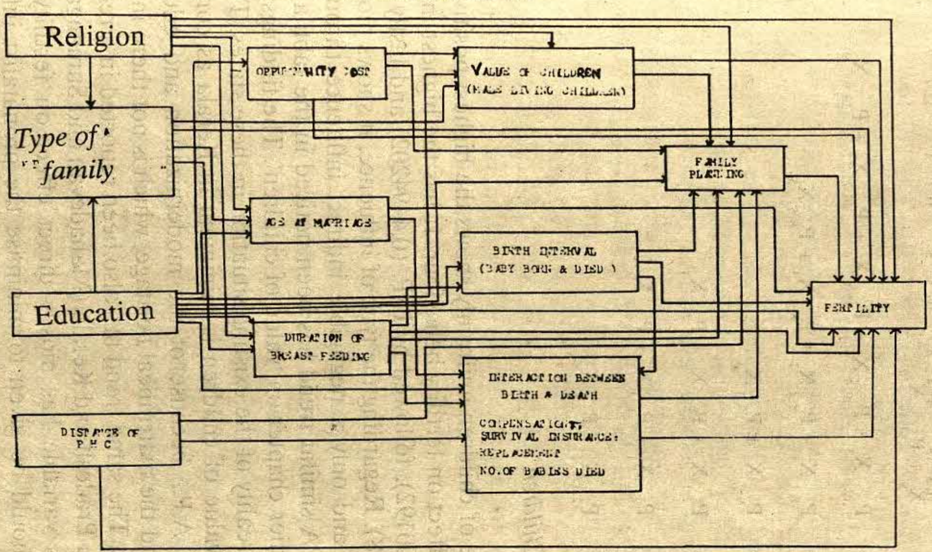
According to the findings from the overall tabulation made in several preceding chapters on the influence of various independent variables on fertility, eleven variables, viz., religion, value of children, type of family, education of wife, opportunity cost, age at marriage, duration of breastfeeding, birth interval, replacement effect, distance to primary health centres and family planning adoption status were found to have significant influence on fertility. Hence these variables have been considered for path analysis. The set of variables has been considered uniformly for all the three states so as to make comparison possible.

In the path model, it is assumed that the fertility has been directly influenced by all the selected independent variables. Further, each of these independent variables in turn are assumed to be influenced by other variables. The path diagram given in Fig.1 explains the causal order of the variables influencing fertility. Even though there are many paths through the independent variables reaching the dependent variable (fertility), a few paths have been selected in calculating the indirect effects. Those paths have been selected with a view that they will have major and meaningful influence on fertility than finding paths for all possible ways. Indirect effect by using the limited number of variables for a given path shows a very negligible influence. Hence making all possible ways and findings indirect effect may not give any meaningful results.

P_{ij} in the above equation are called the path coefficient representing the weights attached to each link in the various causal chain. The direct effect is obtained by the path coefficient between the variables (Pij) and indirect effect is obtained by multiplying the path coefficient of the 'links'.

Tables 8 (a, b & c) give the zero-order correlation matrix for the three states. The path coefficients for the three states are presented in tables 8.2 (a, b & c). The path diagrams with path coefficients for three states are given in Fig.2 (a, b & c). In tables 8.3 (a, b & c), the direct, indirect and total effects of each of the selected eleven independent variables on fertility are given separately for each state.

PATH DIAGRAM FOR FERTILITY


Religion
Type of family
Education
DISTANCE OF P.H.C
OPPORTUNITY COST
AGE AT MARRIAGE
DURATION OF BREAST FEEDING
VALUE OF CHILDREN (MALE LIVING CHILDREN)
BIRTH INTERVAL (BABY BORN & DIED)
INTERACTION BETWEEN BIRTH & DEATH
COMPENSATION; SURVIVAL INSURANCE; REPLACEMENT
NO. OF BABIES DIED
FAMILY PLANNING
FERTILITY

The following structural equations have been derived from the path diagram:

1. $Y_0 = P_{0,1}X_1 + P_{0,2}X_2 + P_{0,3}x_3 + P_{0,4}X_4 + PO_5 + X_5 + P_{0,6}X_6 + P_{0.7}X_7 + P_{0,8}X_8 + P_{0,10}X_{10} + P_{0,11}X_{11}$

2. $X_{11} = P_{11,3}X_3 + P_{11,4}X_4 + P_{11.5}X_5 + P_{11,1}X_1 + P_{11,7}X_7 + P_{11,8}X_8 + P_{11.9}X_9 + P_{11,10}X_{10}$

3. $X_{10} = P_{10,3}X_3 + P_{10,4}X_4 + P_{10.6}X_6 + P_{10.7}X_7 + P_{10,9}X_9$

4. $X_8 = P_{8.1}X_1 + P_{8.2}X_2 + P_{8,3}X_3 + P_{8.5}X_5$

5. $X_9 = P_{9,7}X_7 + P_{9,3}X_3$

6. $X_7 = P_{7.1}X_1 + P_{7.2}X_2 + P_{7.3}X_3$

7. $X_6 = P_{6,1}X_1 + P_{6,2}X_2 + P_{6,3}X_3$

8. $X_2 = P_{2,1}X_1 + P_{2,3}X_3$

Value of Children

Value of children uniformly shows the highest positive and significant effect on fertility behaviour. It has the highest influence in A.P. (0.500192), followed by U.P. (0.4494202) and lastly in Kerala (0.0423868). Regarding the type of influence, it shows mostly direct influence and only a negligible indirect influence through family planning. A similar trend has been noticed in the tabulation given in the earlier chapter on 'value of children'. The findings fully confirms the reality of the existing situation in these states. The importance of value of children is minimum in Kerala as compared to U.P. and A.P., because of the modernization and education of women and the matrilineal heritage, which is not there in the other two states. The same trend has also been reported in a recent study of Andhra Pradesh and Kerala (Mahadevan and Sumangala, 1987). Since this variable has mostly direct effect on fertility, highest priority should be given to minimise the pronatalist influence of this factor particularly in U.P, A.P. and similar other states. In this context a package of social security measures to manipulate various dimensions of value of children as mentioned earlier may be urgently considered by the government. Social security measures like old age pension, insurance policy to be matured at the time of old age, etc., may be feasible.

Duration between Baby Died and Baby Born

The duration between a baby that died and the subsequent baby born is considered as a pronatalist variable on the assumption that a couple may hurriedly have the next baby when they have experienced the mortality of a child (son/daughter). Therefore, this variable is structured into equal intervals and its influence examined. It was hypothesised that greater the effect of mortality experience of the baby, leading to a particular length of birth interval, the higher will be the motivation for additional babies, thus contributing to higher fertility. In this case when experience of child mortality happens one or more times, the couple will end up with more than the required number of children for the purposes of replacement or compensation or insurance. It uniformly showed a positive effect on fertility in all the three states. The effect is highest in U.P. (0.326443) followed by A.P. (0.278549) and Kerala (0.270208). In part III dealing with inter-relationship between fertility and mortality, this variable has again been shown to have a similar influence.

Following this variable another related variable specifically showing the influence of mortality on fertility, viz., "replacement effect", is considered here. However, it shows an exclusively significant and positive influence (0.382506) on fertility in Andhra Pradesh. This reveals the differential perception and behaviour of the people, independent of the existing level of fertility and mortality, to compensate or replace the deceased babies. Perhaps that is why a similar trend is not noticed in U.P. though it was expected. Of course, it cannot have an effect in Kerala because of her very low fertility and mortality. This variable has got an inverse relationship with another variable, viz., the interval between baby died and baby born. These two related variables together differentially influence the fertility patterns among the three states. When we consider their combined effect, it is significant only in U.P. and A.P., where fertility and mortality are very high as against the very low fertility and mortality seen in Kerala. Since these two variables together largely manifest a direct effect and a very negligible indirect effect, it is now beyond doubt that very high priority should be given to the survival of the existing babies through effective mortality control programmes in order to nullify its pronatalist influence.

Opportunity Cost

An index on opportunity cost consist of the following factors, viz., no scope for getting rest, unable to enjoy leisure time, no facility to read and acquire knowledge, inconvenience in taking treatment, paucity of time to look after all the children, inadequate opportunity for school and college education. It shows a uniformly positive and significant effect on fertility mostly in Kerala, followed by U.P. and A.P. As expected, the highest influence is in Kerala (0.300380), because of the greater modernization and education existing in that state. The same trend is reported in the tabulation discussing under opportunity cost in the chapter on socio-economic status. It has a very high direct influence exclusively in Kerala (.192326) but the indirect effect is the highest in U.P. (0.147208), followed by Kerala and A.P., operating through the variables on value of children and family planning. The relationship of opportunity cost with these variables is very high uniformly in Kerala and U.P. but not in A.P. state. The findings point out the existing differential influence of population education in these three states, besides manifesting the existing differences in social development. Since Kerala has highest literacy and level of acceptance of contraception, it is but natural that the concept of opportunity cost would manifest a greater effect in this state than in the other two states. But it is an eye-opener to the other states to strengthen the impact of population education or salient aspects of opportunity cost among the eligible couples.

Education of Wife

The educational status of the wife manifests a significant inverse relationship with fertility uniformly in all the three states. However, its effect is higher in Kerala, followed by A.P. and lastly U.P. as expected, because the educational status of women is extensive in Kerala (64%), followed by A.P. (21%) and lastly in U.P. (14%) according to 1981 census. It showed a more pronounced indirect influence in Kerala, followed by A.P. and it is lowest in U.P.

The indirect effect of education operates through several other factors. It shows a positive influence of fertility through age at marriage, followed by family planning in all the three states. Its effect on age at marriage is highest in Kerala (0.301931) and A.P. (0.181784). Regarding the effect of family planning, it is highest in Kerala (0.014036) followed by A.P. (0.043595) and lastly in U.P. (0.041236). These patterns of indirect influence of education of fertility through age at marriage and family planning are consonant with the existing differential levels in education, age at marriage, contraception and fertility in these states. The findings clearly suggest the urgent need for providing formal and informal education to women all over India as in Kerala because, compared to all other factors, it has widest network of indirect and direct influence through several other factors which depress fertility (see Figure 2).

Breastfeeding

The duration of breastfeeding shows a uniformly positive and significant effect on fertility in all the three states. Its relationship is mostly direct. However, it has relatively more influence in A.P. (0.213051) followed by U.P. (0.212886) and Kerala (0.188261) which is in partial conformity with the existing highest duration of breastfeeding in U.P. (25.4) followed by A.P. (20.6) and Kerala (22.0). These findings fairly agree with the data on Nepal and Bangladesh (Ahmed, 1979). In the order of importance of the variables that directly and indirectly influence fertility behaviour, it has the sixth position, next only to value of children, birth interval between baby died and baby born, opportunity cost, replacement effect and education of wife. With this factor, we have covered most of the significant variables that directly and indirectly influence the fertility behaviour differentially in the three states.

Among the remaining variables, which have considerable influence either in one or more states are: type of family, religion, age at marriage, family planning adoption status and distance to primary health centre. Unlike the preceding six variables, which manifest different levels of significance with fertility, either directly or indirectly, in all the three states, these variables do not have such significant effect in all the three states. Therefore, these variables along with the preceding variables are largely contributory to the existing inter-state differences in fertility across the three states.

Among them, religion and type of family have shown considerable influence in the state of U.P., leading to the existing high fertility there. But their influence is very negligible in the other two states. Age at marriage shows the highest influence as expected in Kerala followed by U.P. and lastly A.P. In fact it is being influenced by education and therefore its individual influence is limited. Similar is the pattern of influence of family planning. The existing distance from the clients to the primary health centres shows a different influence in the three states though its influence is much less in Kerala and A.P. but relatively higher in U.P. All these factors reveal the importance of reducing the negative influence of religious leaders and older relatives in the families, enhancing the age at marriage and strengthening the infrastructure and education in family planning, especially in states like U.P, A.P. and similar other places. This does not mean that only the eleven variables alone are important. Several other variables and their importance have been discussed and highlighted earlier in the respective chapters dealing with the fertility behaviour. No doubt these factors are relatively more important compared to several others which are not considered here. Nevertheless,highest priorities should be given to manipulate the following variables, viz., the value of children, birth interval between baby that died and baby born, opportunity cost, replacement effect, education of women and duration of breastfeeding.

Table 8(a): *Correlation Matrix for the 11 Predictor Variables influencing Fertility (U.P.)*

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	Y_o
X_1	1.000	-0.46	-.040	-.054	-.020	-.278	-.021	-.022	.110	.035	.046	.028
X_2	-.046	1.000	-.065	-.001	-.116	-.040	-.121	.114	.107	-.044	-.029	.227
X_3	-.040	-.065	1.000	-.063	.007	.321	-.061	-.097	-.114	.096	.140	-.142
X_4	-.054	-.001	-.063	1.000	.017	-.056	-.039	.009	-.014	-.050	.065	.045
X_5	-0.20	.116	.007	.017	1.000	-.049	.246	.233	.072	-.072	.125	.318
X_6	-.278	-.040	.321	-.056	-.049	1.000	-.113	-.094	-.146	.033	.058	-.206
X_7	.021	.121	-.061	-.039	.246	-.113	1.000	.328	.152	-.101	.022	.415
X_8	-.022	.114	-.097	.009	.233	-.094	.328	1.000	.098	-.110	.083	.592
X_9	.110	.107	-.114	-.014	.072	-.146	.152	.098	1.000	-.157	-.016	.428
X_{10}	.035	-.044	.096	-.050	-.072	.033	-.101	-.110	-.157	1.000	.090	-.260
X_{11}	.046	-.029	.140	.065	.125	.058	.022	.083	-.016	.090	1.000	.077
Y_o	.028	.227	-.142	.045	.318	-.206	.415	.592	.428	-.260	.077	1.000

Table 8(b): *Correlation Matrix for the 11 Predictor (A.P.) Variables influencing Fertility*

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	Y_o
X_1	1.000	.016	.148	-.064	-.104	.001	-.082	-.085	-.046	.080	.159	-.144
X_2	.016	1.000	-.061	.005	.080	-.013	.105	.062	.059	.033	.109	.126
X_3	.148	-.061	1.000	.010	-.219	.402	-.182	-.112	-.165	.097	.235	-.216
X_4	-.064	.005	.010	1.000	.022	.005	-.037	-.001	-.004	-.006	-.004	.037
X_5	-.104	.080	-.219	.022	1.000	-.131	.193	.078	.064	.018	-.110	.174
X_6	.001	-.013	.402	.005	-.131	1.000	-.139	-.150	-.167	.130	.133	-.230
X_7	-.082	.105	-.182	-.037	.193	-.139	1.000	.330	.153	-.054	.096	.420
X_8	-.085	.062	-.112	-.001	.078	-.150	.330	1.000	.136	-.122	.191	.593
X_9	-.046	.059	-.165	-.004	.064	-.167	.153	.136	1.000	-.181	-.021	.399
X_{10}	.080	.033	.097	-.006	.018	.130	-.054	-.122	-.181	1.000	.077	-.227
X_{11}	.159	.109	.235	-.004	-.110	.133	.096	.191	-.021	.077	1.000	.134
Y_o	-.144	.126	-.216	.037	.174	-.230	.420	.593	.399	-.227	.134	1.000

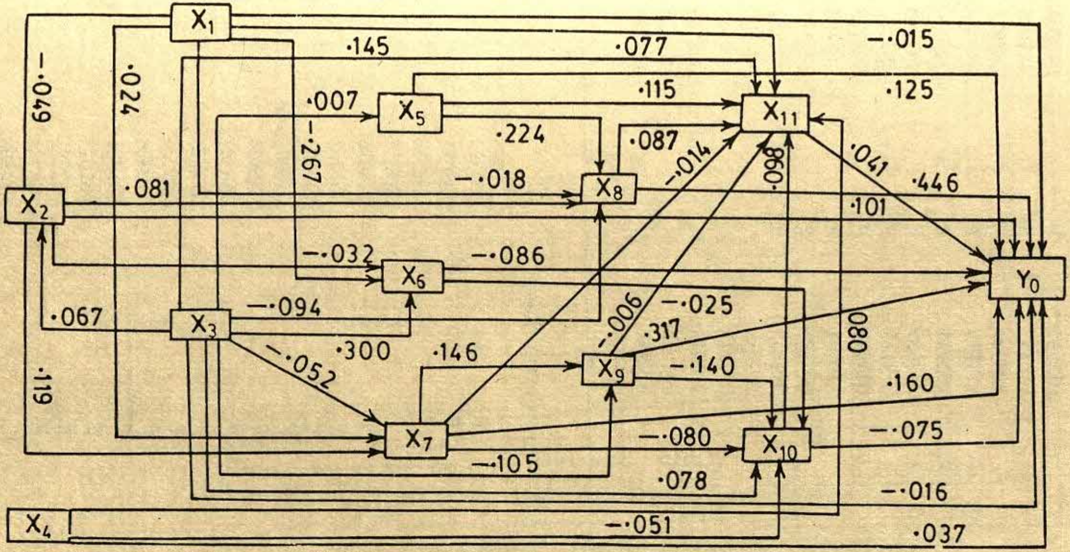
Table 8(c): *Correlation Matrix for the 11 Predictor (Kerala) Variables influencing Fertility*

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	Y_o
X_1	1.000	-.053	.158	-.022	-.111	.201	-.011	-.124	-.051	.122	.049	-.180
X_2	-.053	1.000	-.205	.037	.211	-.124	.202	.183	.104	-.063	.007	.271
X_3	.158	-.205	1.000	-.117	-.226	.382	-.223	-.223	-.234	.184	.284	-.386
X_4	-.022	.037	-.117	1.000	.134	-.008	.048	.030	.021	-.150	-.022	.027
X_5	-.111	.211	-.226	.134	1.000	-.179	.315	.317	.146	-.168	.065	.476
X_6	.201	-.124	.382	-.009	-.179	1.000	-.200	-.243	-.196	.074	.112	-.373
X_7	-.011	.202	-.223	.048	.315	-.200	1.000	.350	.137	-.081	.058	.461
X_8	-.124	.183	-.223	.030	.317	-.243	.350	1.000	.168	-.142	-.022	.655
X_9	-.051	.104	-.234	.021	.146	-.196	.137	.168	1.000	-.189	-.099	.441
X_{10}	.122	.063	.184	-.150	-.168	.074	-.081	-.142	-.189	1.000	.065	-.260
X_{11}	.049	.007	.284	-.022	.065	.112	.058	-.022	-.099	.065	1.000	-.067
Y_o	-.180	.271	-.386	.027	.476	-.373	.461	.655	.441	-.260	-.067	1.000

Table 8.2(a): *Path Coefficients for Fertility (U.P.)*

$P_{0,1}$	-.015266	$P_{9,3}$	-.105119
$P_{0,2}$	.101163	$P_{8,1}$	-.017551
$P_{0,3}$	-.016328	$P_{8,2}$	0.081111
$P_{0,4}$	.036555	$P_{8,3}$	-0.093997
$P_{0,5}$	.124580	$P_{8,5}$	0.223899
$P_{0,6}$	-.086463	$P_{10,3}$	.079951
$P_{0,7}$	.160270	$P_{10,4}$	-.051432
$P_{0,8}$	.445826	$P_{10,6}$	-.025007
$P_{0,9}$	.3168170	$P_{10,7}$	-.079652
$P_{0,10}$	-.074539	$P_{10,9}$	-.140150
$P_{0,11}$	.0412364	$P_{11,3}$	.144786
$P_{2,1}$	-.0.048678	$P_{11,4}$	.079827
$P_{2,3}$	-.0.066947	$P_{11,5}$	.114723
$P_{6,1}$	.007000	$P_{11,1}$	.076713
$P_{6,3}$	-.0.267155	$P_{11,7}$	-.013620
$P_{6,2}$	-0.032255	$P_{11,8}$	.087162
$P_{6,3}$	0.308217	$P_{11,9}$	-.006116
$P_{7,1}$	.024369	$P_{11,10}$	.098289
$P_{7,2}$	.0118721		
$P_{7,3}$	-.052308		
$P_{9,7}$	.145588		

Path Diagram with Coefficient for Fertility – U.P.



X_1 – Religion; X_2 – Type of family; X_3 – Education; X_4 – Distance to PHC; X_5 – Opportunity Cost; X_6 – Age at marriage; X_7 – Duration of breastfeeding; X_8 – Value of children; X_9 – Birth Interval (Baby died & born); X_{10} – Interaction between birth & death – Replacement; X_{11} – Family Planning.
Y_0 – Fertility

Figure 2

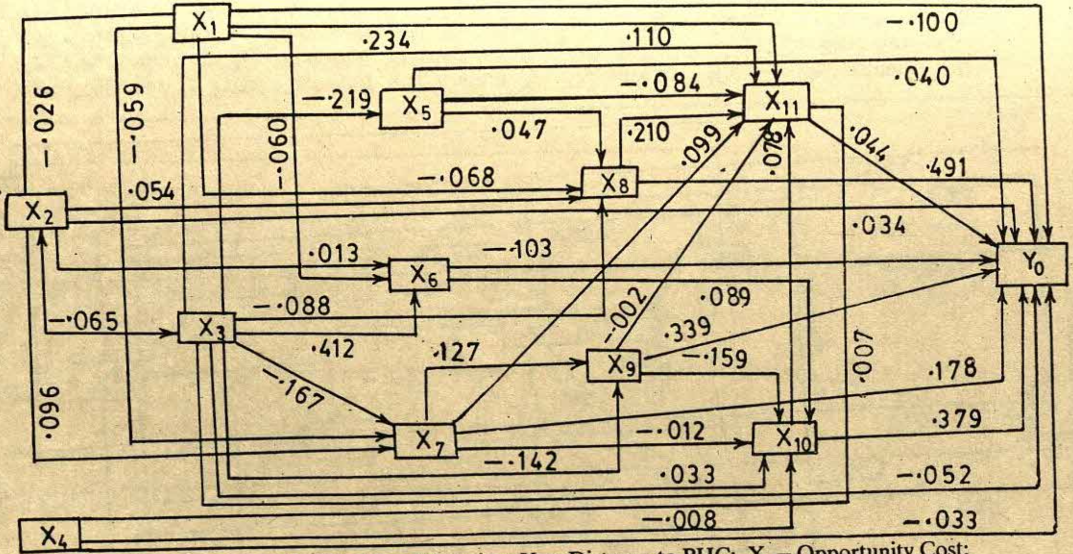
Table 8.2(b): *Path Coefficient for Fertility (A.P.)*

$P_{0,1}$	-.099923	$P_{2,3}$	-.064787
$P_{0,2}$	.033609	$P_{5,3}$	-.21900
$P_{0,3}$	-.052240	$P_{6,1}$	-.060141
$P_{0,4}$	-.032537	$P_{6,2}$	.013076
$P_{0,5}$	.040333	$P_{6,3}$	.411698
$P_{0,6}$	-.103049	$P_{8,1}$	-.067875
$P_{0,7}$	.177770	$P_{8,2}$	.053916
$P_{0,8}$	.491034	$P_{8,3}$	-.088310
$P_{0,9}$	.339436	$P_{8,5}$	.047288
$P_{0,10}$	.379115	$P_{7,1}$	-.58747
$P_{0,11}$	.043595	$P_{7,2}$	.095727
$P_{11,3}$	.234004	$P_{7,3}$	-.167466
$P_{11,4}$	.006880	$P_{9,7}$	.122183
$P_{11,5}$	-.084323	$P_{9,3}$	-.141853
$P_{11,1}$	.109736	$P_{10,3}$	.033130
$P_{11,7}$	.099235	$P_{10,4}$	-.007840
$P_{11,8}$	.210079	$P_{10,6}$	.088552
$P_{11,9}$	-.001592	$P_{10,7}$	-.011625
$P_{11,10}$	.077782	$P_{10,9}$	-.158998
$P_{2,1}$	.025588		

Table 8.2(c) : *Path Coefficient for Fertility (Kerala)*

$P_{0,1}$	-.046029	$P_{8,2}$	0.097375
$P_{0,2}$	.058587	$P_{8,3}$	-0.133695
$P_{0,3}$	-.081893	$P_{8,5}$	0.258578
$P_{0,4}$	-.050798	$P_{9,7}$	.089257
$P_{0,5}$	.192326	$P_{9,3}$	-.214096
$P_{0,6}$	-.097481	$P_{10,3}$	.131663
$P_{0,7}$	.163172	$P_{10,4}$	-.130183
$P_{0,8}$	.424749	$P_{10,6}$	-.013091
$P_{0,9}$	.256920	$P_{10,7}$	-.026864
$P_{0,10}$	-.080719	$P_{10,9}$	-.154343
$P_{0,11}$	-.014036	$P_{11,3}$	.311625
$P_{0,1}$	-.021138	$P_{11,4}$	.000036
$P_{2,3}$	-0.201660	$P_{11,5}$	.110326
$P_{5,3}$	-.22000	$P_{11,1}$	.078208
$P_{6,1}$	1143302	$P_{11,7}$	.081013
$P_{6,2}$	-0.044611	$P_{11,8}$	.062785
$P_{6,3}$	0.350213	$P_{11,9}$	-.055764
$P_{7,1}$	.028316	$P_{11,10}$	.021598
$P_{7,2}$	.163750		
$P_{7,3}$	-.193905		
$P_{8,1}$	-0.069013		

Path Diagram with Path Coefficient for Fertility – A.P.

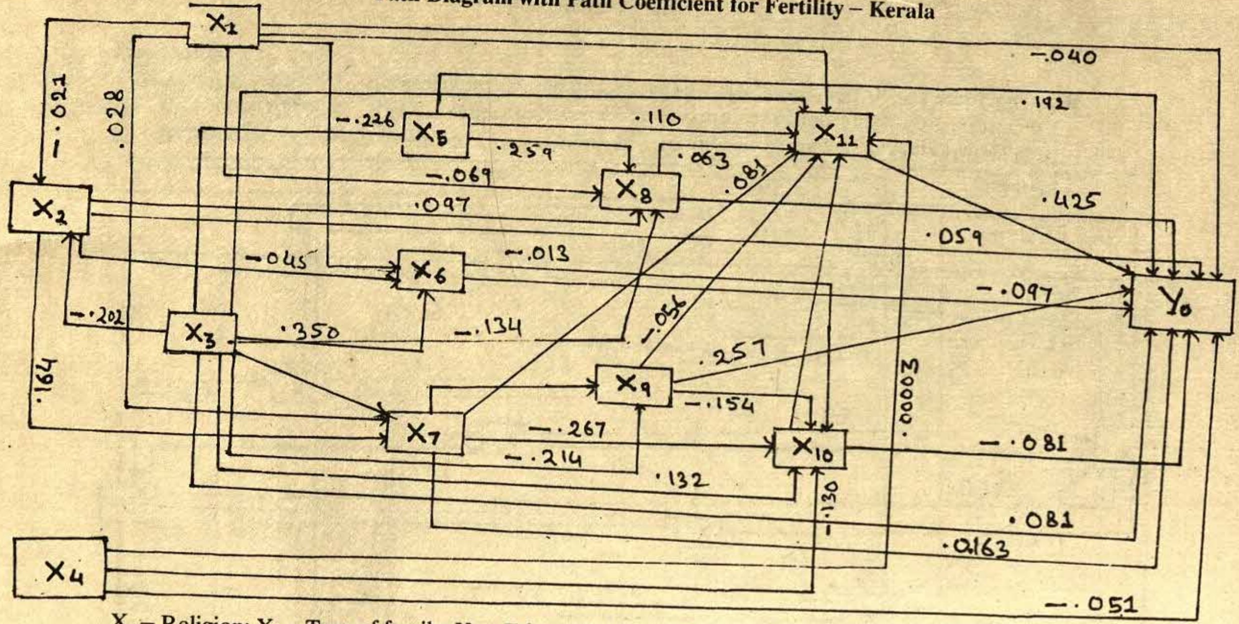


X_1 – Religion; X_2 – Type of family; X_3 – Education; X_4 – Distance to PHC; X_5 – Opportunity Cost; X_6 – Age at marriage; X_7 – Duration of breastfeeding; X_8 – Value of children; X_9 – Birth Interval (Baby died & born); X_{10} – Interaction between birth & death – Replacement; X_{11} – Family Planning.

Y_0 – Fertility

Figure – 2.(a)

Path Diagram with Path Coefficient for Fertility – Kerala



X_1 – Religion; X_2 – Type of family; X_3 – Education; X_4 – Distance to PHC; X_5 – Opportunity Cost; X_6 – Age at marriage; X_7 – Duration of breastfeeding; X_8 – Value of children; X_9 – Birth Interval (Baby died & born); X_{10} – Interaction between birth & death – Replacement; X_{11} – Family Planning.
Y_0 – Fertility

Figure – 2.(b)

Table 8.3(a): *Direct and Indirect Effects of the Variables as per the Path Diagram for Fertility*

Uttar Pradesh

	Direct Effect	
	@—	
	X_1 —h Y ($P_{0,1}$)	-.015266
	X_2 Y ($P_{0,2}$)	.101163
	X_3 Y ($P_{0,3}$)	-.016328
	X_4 Y ($P_{0,4}$)	.036555
	X_5 Y ($P_{0,5}$)	.124580
	X_6 Y ($P_{0,6}$)	-.086463
	X_7 Y ($P_{0,7}$)	.160270
	X_8 Y ($P_{0,8}$)	.445826
	X_9 Y ($P_{0,9}$)	.3168170
	X_{10} Y ($P_{0,10}$)	-.074539
	X_{11} Y ($P_{0,11}$)	.0412364
	Indirect Effect	
X_1 X_2	$\underline{Y}$ ($P_{2,1}$ $P_{0,2}$)	-.004924
X_1 X_6	$\underline{Y}$ ($P_{6,1}$ $P_{0,6}$)	0.023099
X_1 X_6 X_{10}	$\underline{Y}$ ($P_{6,1}$ $P_{10,6}$ $P_{0,10}$)	-.000498
X_1 X_7	$\underline{Y}$ ($P_{7,1}$ $P_{0,7}$)	.003906
X_1 X_7 X_9	$\underline{Y}$ ($P_{7,1}$ $P_{9,7}$ $P_{0,9}$)	.112401
X_1 X_7 X_{10}	$\underline{Y}$ ($P_{7,1}$ $P_{10,7}$ $P_{0,10}$)	.000145
X_1 X_7 X_{11}	$\underline{Y}$ ($P_{7,1}$ $P_{11,7}$ $P_{0,11}$)	-.000014
X_1 X_8	$\underline{Y}$ ($P_{8,1}$ $P_{0,8}$)	-.007825
X_1 X_8 X_{11}	$\underline{Y}$ ($P_{8,1}$ $P_{11,8}$ $P_{0,11}$)	-.000063
X_1 X_{11}	$\underline{Y}$ ($P_{11,1}$ $P_{0,11}$)	.003163
X_2 X_6	$\underline{Y}$ ($P_{6,2}$ $P_{0,6}$)	.002789
X_2 X_6	$\underline{Y}$ ($P_{6,2}$ $P_{0,6}$)	.002789
X_2 X_6 X_{10}	$\underline{Y}$ ($P_{6,2}$ $P_{10,6}$ $P_{0,10}$)	-.000060
X_2 X_7	$\underline{Y}$ ($P_{7,2}$ $P_{0,7}$)	.019027
X_2 X_7 X_9	$\underline{Y}$ ($P_{7,2}$ $P_{9,7}$ $P_{0,9}$)	.005476
X_2 X_7 X_{10}	$\underline{Y}$ ($P_{7,2}$ $P_{10,7}$ $P_{0,10}$)	-.000705
X_2 X_7 X_{11}	$\underline{Y}$ ($P_{7,2}$ $P_{11,7}$ $P_{0,11}$)	-.000667
X_3 X_2	$\underline{Y}$ ($P_{2,3}$ $P_{0,2}$)	.000773
X_3 X_2 X_6	$\underline{Y}$ ($P_{2,3}$ $P_{6,2}$ $P_{0,6}$)	.000187
X_3 X_2 X_6 X_{10}	$\underline{Y}$ ($P_{2,3}$ $P_{6,2}$ $P_{10,6}$ $P_{0,10}$)	-.000403
X_3 X_2 X_7	$\underline{Y}$ ($P_{2,3}$ $P_{7,2}$ $P_{0,7}$)	-.000013
X_3 X_2 X_7 X_9	$\underline{Y}$ ($P_{2,3}$ $P_{7,2}$ $P_{9,7}$ $P_{0,9}$)	-.000004
X_3 X_2 X_7 X_{10}	$\underline{Y}$ ($P_{2,3}$ $P_{7,2}$ $P_{10,7}$ $P_{0,10}$)	.000047
X_3 X_2 X_7 X_{11}	$\underline{Y}$ ($P_{2,3}$ $P_{7,2}$ $P_{11,7}$ $P_{0,11}$)	.000045

@→ There is a causal direction indicating from left to right through arrows in all the the categories, which is not drawn here.

$X_3 X_5$	$Y\ (P_{5,3} P_{0,5})$	.000872
$X_3 X_5 X_8$	$Y\ (P_{5,3} P_{8,5} P_{0,8})$	.000699
$X_3 X_5 X_{11}$	$Y\ (P_{5,3} P_{11,5} P_{0,11})$	.000033
$X_3 X_6$	$Y\ (P_{6,3} P_{0,6})$	-.026649
$X_3 X_6 X_{10}$	$Y\ (P_{6,3} P_{0,6} P_{0,10})$	.000575
$X_3 X_6 X_{10} X_{11}$	$Y\ (P_{6,3} P_{10,6} P_{11,10} P_{0,11})$	-.000031
$X_3 X_7$	$Y\ (P_{7,3} P_{0,7})$	-0.0083834
$X_3 X_7 X_9$	$Y\ (P_{7,3} P_{9,7} P_{0,9})$	-0.0024126
$X_3 X_7 X_9 X_{10}$	$Y\ (P_{7,3} P_{9,7} P_{10,9} P_{0,10})$	-0.0000795
$X_3 X_7 X_9 X_{10} X_{11}$	$Y\ (P_{7,3} P_{9,7} P_{10,9} P_{11,10} P_{0,11})$	0.0000043
$X_3 X_7 X_9 X_{11}$	$Y\ (P_{7,3} P_{9,7} P_{11,9} P_{0,11})$	.0000043
$X_3 X_7 X_{10}$	$Y\ (P_{7,3} P_{10,7} P_{0,10})$	-0.0003105
$X_3 X_7 X_{10} X_{11}$	$Y\ (P_{7,3} P_{10,7} P_{11,10} P_{0,11})$	0.0000168
$X_3 X_7 X_{11}$	$Y\ (P_{7,3} P_{11,7} P_{0,11})$	0.0000293
$X_3 X_8$	$Y\ (P_{8,3} P_{0,8})$	-0.0419063
$X_3 X_8 X_{11}$	$Y\ (P_{8,3\ 11,8} P_{0,11})$	-0.0003378
$X_3 X_9$	$Y\ (P_{9,3} P_{0,9})$	-0.0333034
$X_3 X_9 X_{10}$	$Y\ (P_{9,3} P_{10,9} P_{0,10})$	-0.0010981
$X_3 X_9 X_{10} X_{11}$	$Y\ (P_{9,3} P_{10,9} P_{11,10} P_{0,11})$	0.0000597
$X_3 X_9 X_{11}$	$Y\ (P_{9,3} P_{11,9} P_{0,11})$	0.0000265
$X_3 X_{10}$	$Y\ (P_{10,3} P_{0,10})$	-0.0059594
$X_3 X_{10} X_{11}$	$Y\ (P_{10,3} P_{11,10} P_{0,11})$	0.000324
$X_3 X_{11}$	$Y\ (P_{11,3} P_{0,11})$	0.0059704
$X_4 X_{10}$	$Y\ (P_{10,4} P_{0,10})$	0.0038336
$X_4 X_{10} X_{11}$	$Y\ (P_{10,4} P_{11,10} P_{0,11})$	-0.0002084
$X_4 X_{11}$	$Y\ (P_{11,4} P_{0,11})$	0.0032917
$X_5 X_8$	$Y\ (P_{8,5} P_{0,8})$	.099820
$X_5 X_8 X_{11}$	$Y\ (P_{8,5} P_{11,8} P_{0,11})$	.000080
$X_5 X_{11}$	$Y\ (P_{11,5} P_{0,11})$	.047308
$X_6 X_{10}$	$Y\ (P_{10,6} P_{0,10})$	.001864
$X_6 X_{10} X_{11}$	$Y\ (P_{10,6} P_{11,10} P_{0,11})$	-.000010
$X_7 X_9$	$Y\ (P_{9,7} P_{0,9})$	0.0461247
$X_7 X_9 X_{10}$	$Y\ (P_{9,7} P_{10,9} P_{0,10})$	0.0015209
$X_7 X_9 X_{10} X_{11}$	$Y\ (P_{9,7} P_{10,9} P_{11,10} P_{0,11})$	-0.0000826
$X_7 X_{10}$	$Y\ P_{10,7} P_{0,10})$	0.0059371
$X_7 X_{10} X_{11}$	$Y\ (P_{10,7} P_{11,10} P_{0,11})$	-0.0003228
$X_7 X_{11}$	$Y\ (P_{11,7} P_{0,11})$	-0.0005616
$X_8 X_{11}$	$Y\ (P_{11,8} P_{0,11})$	0.0035942
$X_9 X_{10}$	$Y\ (P_{10,9} P_{0,10})$	0.0104466
$X_9 X_{10} X_{11}$	$Y\ (P_{10,9} P_{11,10} P_{0,11})$	-0.000568
$X_9 X_{11}$	$Y\ (P_{11,9} P_{0,11})$	-0.0002522
$X_{10} X_{11}$	$Y\ (P_{11,10} P_{0,11})$	0.004053

Table 8.3(b): *Direct and Indirect Effects of the Variables on Fertility (Andhra Pradesh)*

	Direct Effect	
X_1	$Y\ (P_{0,1})$	-.99923
X_2	$Y\ (P_{0,2})$	.033609
X_3	$Y\ (P_{0,3})$	-.052240
X_4	$Y\ (P_{0,4})$	-.032537
X_5	$Y\ (P_{0,5})$	.040333
X_6	$Y\ (P_{0,6})$	-.103049
X_7	$Y\ (P_{0,7})$	.177770
X_8	$Y\ (P_{0,8})$	.491034
X_9	$Y\ (P_{0,9})$	.339436
X_{10}	$Y\ (P_{0,10})$	.379115
X_{11}	$Y\ (P_{0,11})$	.043595
	Indirect Effect	
$X_1\ X_2$	$Y\ (P_{2,1}\ P_{0,2})$	.000860
$X_1\ X_6$	$Y\ (P_{6,1}\ P_{0,6})$	.006197
$X_1\ X_6\ X_{10}$	$Y\ (P_{6,1}\ P_{10.6}\ P_{0.10})$	-.002019
$X_1\ X_7$	$Y\ (P_{7,1}\ P_{0,7})$	-.010443
$X_1\ X_7\ X_9$	$Y\ (P_{7,1}\ P_{9,7}\ P_{0,9})$	-.002536
$X_1\ X_7\ X_{10}$	$Y\ (P_{7,1}\ P_{10.7}\ P_{0.10})$	.002589
$X_1\ X_7\ X_{11}$	$Y\ (P_{7,1}\ P_{11.7}\ P_{0.11})$	-.002541
$X_1\ X_8$	$Y\ (P_{8,1}\ P_{0.8})$	-.03333
$X_1\ X_8\ X_{11}$	$Y\ (P_{8,1}\ P_{11,8}\ P_{0.11})$	-.000622
$X_2\ X_6$	$Y\ (P_{6,2}\ P_{0,6})$	-.001347
$X_2\ X_6\ X_{10}$	$Y\ (P_{6,2}\ P_{10.6}\ P_{0.10})$	.000439
$X_2\ X_7$	$Y\ (P_{7,2}\ P_{0,7})$	.017017
$X_2\ X_7\ X_9$	$Y\ (P_{7,2}\ P_{9,7}\ P_{0,9})$	.004133
$X_2\ X_7\ X_{10}$	$Y\ (P_{7,2}\ P_{10.7}\ P_{0.10})$	-.000422
$X_2\ X_7\ X_{11}$	$Y\ (P_{7,2}\ P_{11.7}\ P_{0.11})$	.000414
$X_3\ X_3$	$Y\ (P_{2,3}\ P_{0,2})$	-.002177
$X_3\ X_2\ X_6$	$Y\ (P_{2,3}\ P_{6.2}\ P_{0,5})$	.000087
$X_3\ X_2\ X_6\ X_{10}$	$Y\ (P_{2,3}\ P_{6.2}\ P_{10.6}\ P_{0.10})$	-.000028
$X_3\ X_2\ X_7$	$Y\ (P_{2,3}\ P_{7,2}\ P_{0,7})$	-.001103
$X_3\ X_2\ X_7\ X_9$	$Y\ (P_{2,3}\ P_{7.2}\ P_{9,7}\ P_{0,9})$	.000024
$X_3\ X_2\ X_7\ X_{10}$	$Y\ (P_{2,3}\ P_{7.2}\ P_{10.7}\ P_{0.10})$	-.000027
$X_3\ X_2\ X_7\ X_{11}$	$Y\ (P_{2,3}\ P_{7.2}\ P_{11,7}\ P_{0.11})$	-.000027
$X_3\ X_5$	$Y\ (P_{5,3}\ P_{0.5})$	-.008823
$X_3\ X_5\ X_8$	$Y\ (P_{5,3}\ P_{8,5}\ P_{0.8})$	-.00509
$X_3\ X_5\ X_{11}$	$Y\ (P_{5,3\ 11,5}\ P_{0.11})$	.008049
$X_3\ X_6$	$Y\ (P_{6,3}\ P_{0,6})$	-.042425
$X_3\ X_6\ X_{10}$	$Y\ (P_{6,3}\ P_{10.6}\ P_{0.10})$	.013821
$X_3\ X_6\ X_{10}\ X_{11}$	$Y\ (P_{6,3}\ P_{10.6}\ P_{11,10}\ P_{0,11})$	.000124
$X_3\ X_7$	$Y\ (P_{7,3}\ P_{0.7})$	-.029770

$X_3 X_7 X_9$	$Y\ (P_{7,3} P_{9,7} P_{0,9})$	-.007230
$X_3 X_7 X_9 X_{10}$	$Y\ (P_{7,3} P_{9.7} P_{10.9} P_{0.10})$	.001284
$X_3 X_7 X_9 X_{10} X_{11}$	$Y\ (P_{7,3} P_{9,7} P_{10.9} P_{11,10} P_{0.11})$	.000011
$X_3 X_7 X_9 X_{11}$	$Y\ (P_{7,3} P_{9,7} P_{11.9} P_{0.11})$	.000003
$X_3 X_7 X_{10}$	$Y\ (P_{7,3} P_{10.7} P_{0.10})$	.000738
$X_3 X_7 X_{10} X_{11}$	$Y\ (P_{7,3} P_{10.7\ 11.10} P_{0.11})$	.000007
$X_3 X_7 X_{11}$	$Y\ (P_{7.3\ 11.7} P_{0.11})$	-.000724
$X_3 X_8$	$Y\ (P_{8,3} P_{0.8})$	-.043363
$X_3 X_8 X_{11}$	$Y\ (P_{8,3\ 11,8} P_{0.11})$	-.000809
$X_3 X_9$	$Y\ (P_{9,3} P_{0,9})$	-.048150
$X_3 X_9 X_{10}$	$Y\ (P_{9,3} P_{10,9} P_{0.10})$	.008551
$X_3 X_9 X_{10} X_{11}$	$Y\ (P_{9,3} P_{10.9} P_{11,10})$	.000076
$X_3 X_9 X_{11}$	$Y\ (P_{9,3\ 11,9} P_{0.11})$	.000010
$X_3 X_{10}$	$Y\ (P_{10,3} P_{0.10})$	.012560
$X_3 X_{10} X_{11}$	$Y\ (P_{10.3\ 11.10} P_{0.11})$	.000112
$X_3 X_{11}$	$Y\ (P_{11,3} P_{0,11})$	.010201
$X_4 X_{10}$	$Y\ (P_{10,4} P_{0.10})$	-.002972
$X_4 X_{10} X_{11}$	$Y\ (P_{10,4} P_{11.10} P_{0.11})$	-.000027
$X_4 X_{11}$	$Y\ (P_{11,4} P_{0,11})$	.000300
$X_5 X_8$	$Y\ (P_{8,5} P_{0,8})$	.023220
$X_5 X_8 X_{11}$	$Y\ (P_{8,5} P_{11.8} P_{0.11})$	.000433
$X_5 X_{11}$	$Y\ (P_{11,5} P_{0.11})$	-.003676
$X_6 X_{10}$	$Y\ (P_{10,6} P_{0.10})$	.033571
$X_6 X_{10} X_{11}$	$Y\ (P_{10,6} P_{11,10} P_{0.11})$	.000300
$X_7 X_9$	$Y\ (P_{9,7} P_{0,9})$	.043170
$X_7 X_9 X_{10}$	$Y\ (P_{9,7} P_{10,9} P_{0.11})$	-.007666
$X_7 X_9 X_{10} X_{11}$	$Y\ (P_{9,7} P_{10.9\ 11,10} P_{0.11})$	-.000069
$X_7 X_{10}$	$Y\ (P_{10,7} P_{0.10})$	-.004407
$X_7 X_{10} X_{11}$	$Y\ (P_{10,7} P_{11.10} P_{0.11})$	-.000039
$X_7 X_{11}$	$Y\ (P_{11,7} P_{0.11})$	.004326
$X_8 X_{11}$	$Y\ (P_{11,8} P_{0.11})$	.009158
$X_9 X_{10}$	$Y\ (P_{10,9} P_{0.10})$	-.060279
$X_9 X_{10} X_{11}$	$Y\ (P_{10,9} P_{11.10} P_{0.11})$	-.000539
$X_9 X_{11}$	$Y\ (P_{11,9} P_{0.11})$	-.000069
$X_{10} X_{11}$	$Y\ (P_{11,10} P_{0,11})$	.003391

Table 8.3(c): *Direct and Indirect Effects of the Variables on Fertility (Kerala)*

	Direct Effect	
X_1	Y $(P_{0,1})$	-.046029
X_2	Y $(P_{0,2})$	.058587
X_3	Y $(P_{0,3})$	-.081893
X_4	Y $(P_{0,4})$	-.050798
X_5	Y $(P_{0,5})$	.192326
X_6	Y $(P_{0,6})$	-.007481
X_7	Y $(P_{0,7})$	.163172
X_8	Y $(P_{0,8})$	.424749
X_9	Y $(P_{0,9})$	.256920
X_{10}	Y $(P_{0,10})$	-.080719
X_{11}	Y $(P_{0,11})$	-.014036
	Indirect Effect	
$X_1\ X_2$	Y $(P_{2,1}\ P_{0,2})$	-.0012384
$X_1\ X_6$	Y $(P_{6,1}\ P_{0,6})$	-.0139692
$X_1\ X_6\ X_{10}$	Y $(P_{6,1}\ P_{10.6}\ P_{0,10})$	0.0001514
$X_1\ X_7$	Y $(P_{7,1}\ P_{0,7})$	0.0046203
$X_1\ X_7\ X_9$	Y $(P_{7,1}\ P_{9,7}\ P_{0,9})$	0.0006493
$X_1\ X_7\ X_{10}$	Y $(P_{7,1}\ P_{10.7}\ P_{0.10})$	0.0000614
$X_1\ X_7\ X_{11}$	Y $(P_{7,1}\ P_{11.7}\ P_{0.11})$	-0.0000321
$X_1\ X_8$	Y $(P_{8,1}\ P_{0,8})$	-.0293132
$X_1\ X_8\ X_{11}$	Y $(P_{8,1}\ P_{11.8}\ P_{0,11})$	0.0000608
$X_1\ X_{11}$	Y $(P_{11,1}\ P_{0,11})$	-0.0010977
$X_2\ X_6$	Y $(P_{6,2}\ P_{0,6})$	0.0043497
$X_2\ X_6\ X_{10}$	Y $(P_{6,2}\ P_{10.6}\ P_{0.10})$	-0.0000471
$X_2\ X_7$	Y $(P_{7,2}\ P_{0.7})$	0.0267194
$X_2\ X_7\ X_9$	Y $(P_{7,2}\ P_{9,7}\ P_{0,9})$	0.003755
$X_2\ X_7\ X_{10}$	Y $(P_{7,2}\ P_{10.7}\ P_{0.10})$	0.000355
$X_2\ X_7\ X_{11}$	Y $(P_{7,2} P_{11.7}\ P_{0.11})$	-0.0001861
$X_3\ X_2$	Y $(P_{2,3}\ P_{0.2})$	0.0118146
$X_3\ X_2\ X_6$	Y $(P_{2,3}\ P_{6.2}\ P_{0.6})$	-0.0008769
$X_3\ X_2\ X_6\ X_{10}$	Y $(P_{2,3}\ P_{6.2}\ P_{10.6}\ P_{0.10})$	0.0000095
$X_3\ X_2\ X_7$	Y $P_{2,3}\ P_{7,2}\ P_{0.7}$	-0.0053882
$X_3\ X_2\ X_7\ X_9$	Y $(P_{2,3}\ P_{7.2}\ P_{9.7}\ P_{0.9})$	-0.0007572
$X_3\ X_2\ X_7\ X_{10}$	Y $(P_{2,3}\ P_{7.2}\ P_{10.7}\ P_{0.10})$	-0.0000716
$X_3\ X_2\ X_7\ X_{11}$	Y $(P_{2,3}\ P_{7.2}\ P_{11.7}\ P_{0.11})$	0.0000375
$X_3\ X_5$	Y $(P_{5,3}\ P_{0.5})$	-0.04346
$X_3\ X_5\ X_8$	Y $(P_{5,3}\ P_{8,5}\ P_{0.8})$	-0.02482
$X_3\ X_5\ X_{11}$	Y $(P_{5,3}\ P_{11,5}\ P_{0,11})$	0.000348
$X_3\ X_6$	Y $(P_{6,3}\ P_{0.6})$	-0.0341391
$X_3\ X_6\ X_{10}$	Y $(P_{6,3}\ P_{10.6}\ P_{0.10})$	0.00037
$X_3\ X_6\ X_{10}\ X_{11}$	Y $(P_{6,3}\ P_{10.6}T]P_{11,10}\ P_{0,11})$	0.0000013

$X_3 X_7$	$Y\ (P_{7,3} P_{0,7}$	-0.0316398
$X_3 X_7 X_9$	$Y\ (P_{7,3} P_{9,7} P_{0,9})$	-0.0044466
$X_3 X_7 X_9 X_{10}$	$Y\ (P_{7,3} P_{9,7} P_{10.9} P_{0,10})$	-0.0002156
$X_3 X_7 X_9 X_6 X_{11}$	$Y\ (P_{7,3} P_{9.7} P_{10.9} T]P_{11,10} P_{0.11})$	-0.0000008
$X_3 X_7 X_9 X_{11}$	$Y\ (P_{7,3} P_{9.7} P_{11,9} P_{0,11})$	-0.00000135
$X_3 X_7 X_{10}$	$Y\ P_{7,3} P_{10,7} P_{0,10})$	-0.0004204
$X_3 X_7 X_{10} X_{11}$	$Y\ (P_{7,3} P_{10.7} P_{11,10} P_{0,11})$	-0.0000015
$X_3 X_7 X_{11}$	$Y\ (P_{7,3\ 11,7} P_{0,11})$	0.0002204
$X_3 X_8$	$Y\ (P_{8,3} P_{0.8})$	-0.0567868
$X_3 X_8 X_{11}$	$Y\ (P_{8,3\ 11,8} P_{0.11})$	0.0001178
$X_3 X_9$	$Y\ (P_{9,3} P_{0.9})$	-0.0550055
$X_3 X_9 X_{10}$	$Y\ (P_{9,3} P_{10.9} P_{0.10})$	-0.0026672
$X_3 X_9 X_{10} X_{11}$	$Y\ (P_{9,3} P_{10.9} P_{11,10} P_{0,11})$	-0.000001
$X_3 X_9 X_{11}$	$Y\ (P_{9,3\ 11,9} P_{0,11})$	-0.0001675
$X_3 X_{10}$	$Y\ (P_{10.3} P_{0.10})$	-0.0106277
$X_3 X_{10} X_{11}$	$Y\ (P_{10.3\ 11,10} P_{0,11})$	0.0000399
$X_3 X_{11}$	$Y\ (P_{11.3} P_{0,11})$	-0.0043739
$X_4 X_{10}$	$Y\ (P_{10.4} P_{0.10})$	0.0105082
$X_4 X_{10} X_{11}$	$Y\ (P_{10,4} P_{11.10} P_{0.11})$	0.0000394
$X_4 X_{11}$	$Y\ (P_{11,4} P_{0.1})$	-0.0000005
$X_5 X_8$	$Y\ (P_{8,5} P_{0,8})$	0.1098307
$X_5 X_8 X_{11}$	$Y\ (P_{8,5\ P}11,8\ _{P}0,11)$	-0.0002278
$X_5 X_{11}$	$Y\ (P_{11.5} P_{0.11})$	-.0015485
$X_6 X_{10}$	$Y\ (P_{10,6} P_{0.10})$	0.0010566
$X_6 X_{10} X_{10}$	$Y\ (P_{10,6} P_{11,10} P_{0.11})$	0.0000039
$X_7 X_9$	$Y\ (P_{9,7} P_{0,9})$	0.0229319
$X_7 X_9 X_{10}$	$Y\ (P_{9,7} P_{10.9} P_{0.10})$	0.0011112
$X_7 X_9 X_{10} X_{11}$	$Y\ (P_{9.7} P_{10.9} P_{11.10} P_{0.11})$	0.0000041
$X_7 X_{10}$	$Y\ (P_{10.7} P_{0,10})$	0.0021684
$X_7 X_{10} X_{11}$	$Y\ (P_{10,7} P_{11.10} P_{0.11})$	0.0000081
$X_7 X_{11}$	$Y\ (P_{11.7} P_{0.11})$	-0.001137
$X_8 X_{11}$	$Y\ (P_{11.8} P_{0.11})$	-0.0008812
$X_9 X_{10}$	$Y\ (P_{10.9} P_{0.10})$	0.0124584
$X_9 X_{10} X_{11}$	$Y\ P_{10.9} P_{11,10} P_{0.11})$	0.0090467
$X_9 X_{11}$	$Y\ (P_{11.9} P_{0.11})$	0.0007827
$X_{10} X_{11}$	$Y\ (P_{11.10} P_{0.11})$	-0.0003031

Table 8.4(a): *Direct, Indirect and Total Effects of 11 Variables on Fertility – U.P.*

Variable	Direct Effect	Indirect Effect	Total Effect
Religion (X_1)	-.015266	0.12939	0.114124
Type of Family (or kinship interaction) (X_2)	.101163	0.02727	0.128433
Education of Wife (X_3)	-.016328	-.1200391	-.134763
Distance to P.H.C. (X_4)	.036555	0.0069169	0.0434719
Opportunity Cost (X_5)	.124580	0.147208	0.271788
Age at Marriage of Wife (X_6)	-.086463	0.001854	-.084609
Duration of Breastfeeding (X_7)	.160270	0.0526157	0.2128859
Value of children (male living children) (X_8)	.445826	0.0035942	0.4494202
Birth Interval (Baby born & died) (X_9)	.3168170	0.0096264	0.3264434
Interaction between birth & death (X_{10})	-.074539	0.004053	-.070486
Family Planning Adoption Status (X_{11})	0.0412364	-	0.0412364

Table 8.4(b): *Direct, Indirect and Total Effects of 11 Variables on Fertility – A.P.*

Variable	Direct Effect	Indirect Effect	Total Effect
Religion (X_1)	.099923	-.037061	0.062862
Type of Family (or kinship interaction) (X_2)	.033609	0.020234	0.053843
Education of Wife (X_3)	-.052240	-.128224	-.181784
Distance to P.H.C. (X_4)	-.032537	-.002699	0.035236
Opportunity Cost (X_5)	.040333	-.019977	0.020356
Age at Marriage of Wife (X_6)	-.103049	.033871	-0.069178
Duration of Breastfeeding (X_7)	.17770	.035315	0.213015
Value of Children (male living children) (X_8)	.491034	.009158	0.500192
Birth Interval (Baby born & died) (X_9)	.339436	-.060887	0.278549
Interaction between Birth & Death (X_{10})	.379115	.003391	0.382506
Family Planning Adoption Status (X_{11})	0.943595	-	0.043595

Table 8.4(c): *Direct, Indirect and Total Effects of 11 Variables on Fertility – Kerala*

Variables	Direct Effect	Indirect Effect	Total Effect
Religion (X_1)	-.046029	-0.0401074	-0.0861364
Type of Family (or kinship interaction) (X_2)	.058587	.34945	0.093532
Education of Wife (X_3)	-.081893	-.2193587	-0.301931
Distance to P.H.C. (X_4	-.050798	0.010547	-.040251
Opportunity Cost (X_5)	.192326	0.108054	0.30038
Age at Marriage of Wife (X_6)	-.097481	0.001061	-.09642
Duration of Breastfeeding (X_7)	.163172	0.025089	0.188261
Value of Children (male living children) (X_8)	.424749	-0.000881	0.423868
Birth Interval (Baby born & died) (X_9)	.256920	0.013288	0.270208
Interaction between Birth & Death (X_{10})	-.080719	-0.000303	-0.081022
Family Planning Adoption Status (X_{11})	-0.14036	-	-.014036

Table 8.5: *Path Analysis Results for Fertility*

Name of the Variable	U.P.	A.P.	Kerala
(+) Value of Children	2	1	3
(+) Birth Interval (baby died and born)	1	2	3
(+) Opportunity Cost	2	3	1
(+) Replacement	3	1	2
(-) Education of Wife	3	2	1
(+) Duration of Breastfeeding	2	1	3
(+) Type of Family	1	3	2
(+) Religion	1	3	2
(-) Age at Marriage	2	3	1
(-) Family Planning	2	1	3
(-) Distance to P.H.C.	1	3	2

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Summary and Implications

The Problem

This book-length study is the outcome of a large scale National Project that was carried out in 1984 in three major regions of India on determinants of fertility, mortality and their interaction besides the trends and differentials of these vital events. The location of the study includes the northern, south central and extreme southern regions represented by the Uttar Pradesh (U.P.), Andhra Pradesh (A.P.) and Kerala states respectively. These three regions manifest different cultural patterns, levels of development and different trends in demographic profile due to the heterogenous culture of India. Uttar Pradesh represents the traditional culture of Northern India with less socio-economic development and highest level of fertility and infant mortality. Andhra Pradesh is one of the developed states in India, next only to Punjab, Haryana and Maharastra states in the field of agriculture and industry. Demographically, A.P. falls in between the U.P. and Kerala states, but the people are only moderately modernised and manifest traditional life styles and behaviour. Kerala, on the other hand though economically backward when compared to U.P. and A.P. is far ahead of all the other Indian states in terms of the level of modernization and social development. Her fertility and mortality rates are the lowest in India. According to the 1981 census, the crude birth rates in Kerala, A.P. and U.P. states were 25.6, 31.7, 39.6 and death rates were 5.6, 11.1 and 16.3 respectively (1981 census). The all-India rates during the same period were 33.9 and 12.5 respectively. Infant mortality rates by 1981 were 37, 86, 150 in Kerala, A.P. and U.P. respectively and 110 for India as a whole. On the social front, while 70.4 percent of the people in Kerala are literate, only 29.9 percent in A.P. and 27.2 percent in U.P. and 36.2 percent at the all India level fall under the same category. Regarding the literacy of women, more or less the same trend is noticed. In Kerala it is 64.5 percent, 20.5 percent in A.P., and only 14.4 percent in U.P. as against 24.8 percent at the all-India level. Economically also these states differ in most aspects. The per capita income is Rs. 667 in Kerala, Rs. 718 in A.P. and Rs. 510 in U.P. as against Rs. 720 for India at constant prices by 1981-82 (c.s.o, 1982). As far as the people below the poverty line are concerned, U.P. is far above these states in this regard with 50 percent of population followed by Kerala with 47 percent and A.P. 42.21 percent, the percentage at the all-India level being 48.1 per cent (CMIE, 1983). All these data vividly reflect the existing diversity of the states which are considered here for study to make it a representative study at least covering the major diverse regions of India.

Method and Data

The major objectives of the present research are to study: (1) the levels and differentials in fertility and mortality and their inter-relationship; (2) the region-wise and culture-wise differences in the determinants of fertility and mortality; (3) the trends and changes in the status of women, age at marriage, norms and values and their differential influence on fertility and mortality; (4) food and nutrition, status of health, environmental factors and their influence on mortality; (5) influence of life affecting variables; 'intermediate variables' and other determinants on these vital events relevant to the population under study.

From the three states of U.P., A.P. and Kerala a total sample size of 6,500 eligible women, that is, women in the reproduction period living with their husbands and also having one or more children, have been considered for the study. A sample size of 2,500 is considered for getting an optimum number of live births and infant deaths particularly from Kerala where the rates are very low. However, from U.P. and A.P. only 2,000 eligible couple each have been considered.

A schedule was developed and used for the data collection. To supplement the schedule and to improve the quality of data, non-participant observation was also used wherever needed. Anthropometric measurements were adopted to study the nutrition and health status of children and mothers, besides observing and asking questions on the health status of eligible women. Clinical analysis of blood was carried out only for the villages considered for the in-depth study (results given in separate volume). For the study of food choice, an approved method used in dietary survey was followed. Thus, we have used a combination of different tools for gathering data on different variables. Computer facility was used for the analysis of data. The presentation of data largely depended on several types of tables, path analysis and on a descriptive basis using case studies of families and three villages.

This book is divided into three parts and each part contains several chapters. The three parts include: (1) fertility and family formation variables; (2) mortality and life affecting variables; and (3) interrelationship between fertility and mortality.

Nuptiality and Fertility: Depending upon the caste background and regional variations in India, marriage forms a complex or a simple social institution. Marriage selections are very often made endogamously (within the same caste) on the basis of caste and exogamously on the basis of the residential villages, among people of the same village. Marriage between certain relatives only are permitted and such marriages vary among these states. According to our findings 94 percent of marriages in U.P., 60 percent and 79 percent in A.P. and Kerala respectively were solemnised between non-related (prior to marriage) bride and bridegroom. Our study reveals that marriage among related people is more common in A.P., less in Kerala and negligible in U.P. Marriage with one's relatives is generally prohibited in U.P., but in A.P. and Kerala cross-cousin marriages are common. Matrilateral cross-cousin marriage is more frequent than the patrilateral one in both A.P. and Kerala. Uncle-niece marriages are common in A.P., Tamil Nadu and Karnataka.

Age at Marriage and Fertility: According to the ancient *Grahya* and *Dharma Sūtras*, girls were married just before the time of puberty or immediately thereafter. However, since Independence, age at marriage of girls and boys has increased considerably. According to 1981 census the girls' mean age at marriage were 18, 17.6 and 21.9 in U.P., A.P. and Kerala states and for boys it was 21.2, 23.1 and 27.2 respectively in these three states. The age at marriage of men and women in these states took place far below the legal age at marriage prescribed for them, except for men in Kerala. According to the present study these women got married at 12.7, 14.1 and 19.0 and men wedded at 17.4, 20.9 and 25.9 respectively in U.P., A.P. and Kerala states. These must have been solemnised during the last 30 years or even earlier. When age at marriage of wife and husband are examined separately in relation to fertility, controlling the duration of married life exclusively for women, a negative association is observed in all the three states and at the aggregate level.

Determinants of Age at Marriage

Determinants of early and late marriages have been reported under the nuptiality chapter. Seven major reasons have been cited for the early age at marriages. They are: (i) to avoid the risk of girls going astray; (ii) keeping grown-up girls at home is a strain for parents; (iii) marriage should be arranged when parents are economically in an active position; (iv) social pressure operating from relatives and neighbours; (v) cinema seeing creates early sexual need; (vi) on religious ground; and (viii) to avoid dowry. On the other hand, six reasons have been mentioned for the late marriage of girls. They are: (1) inability to raise dowry on time; (2) want of a suitable alliance; (3) waiting for completion of education; (4) astrological incompatibility; (5) waiting for a job; and (6) suitability of a late marriage for adjustment. Considering the determinants of early and late marriages together we can identify several policy issues to promote late marriage, particularly among girls.

Implications: (i) The Gauna ceremony is a positive custom which can be strengthened, particularly in U.P., Bihar, Madhya Pradesh and Rajasthan, where child marriages and subsequent Gauna ceremonies are widely reported. Since Gauna is an age-old custom, it is easy to prolong it certain appropriate incentives are offered. Demanding the postponement of age at marriage alone may meet with resistance but postponement of age at marriage as well as Gauna together may be considered.

(ii) Films and documentaries showing the bad effects of early marriages, sexual problems and high fertility may be encouraged. In this context seminars for film producers, directors and actors may be periodically organised.

(iii) Marriage insurance policies may be promoted by the L.I.C. and other such agencies; even a retired person may be offered suitable facility/provisions by his former parent department or by voluntary and religious organizations to provide facility/loan to arrange marriages of his children. In this context completely equipped marriage halls may be constructed all over the country as has been done by the Tirumala Tirupati Devasthanam in a limited scale in A.P., and such facilities may be offered free of cost or at a nominal charge to parents who celebrate marriages above the nationally prescribed ages at marriage for girls and boys.

(iv) Girls who have come of age may be provided with suitable education or at least part-time employment to pre-occupy them suitably till the age of 20 and above or till the time of marriage.

(v) A package of suitable incentives to parents and bride/groom may be considered to postpone marriage.

(vi) Periodic population education on the importance of late marriage and dangers of early marriage may be propagated to children at the high school level, to parents and elderly people who make decisions on marriage and to religious and social leaders in order that they may help to bring about a change in the existing early marriage patterns.

Fertility Differentials

Fertility varies significantly among the states of U.P, A.P. and Kerala. The CBR is highest in U.P. (34.5) followed by A.P. (31.8) and Kerala (26.8). The pooled rate for India is 31.1. The average number of live births of these states are 5.2, 4.2 and 3.3. respectively and at the aggregate level it is 4.1. Of course these rates are for the couple who have one or more live births. Differential fertility is also noticed between districts within the same state and across different states. The birth rates, however, do not vary much between Jhansi (35.2) and Gorakhpur (34.0) districts of U.P. But it varies within A.P. and Kerala. In A.P., the Kurnool district (38.4) has significantly higher fertility than the Guntur district (24.3). In Kerala, the Palghat (29.2) and Alleppey (29.4) districts have similar rates as against a significantly lower rate seen in the Trivandrum district (24.6). Surprisingly, the Guntur district in A.P. has a low birth rate like the Trivandrum district in Kerala. Not only has fertility varied in the past in these districts but it is likely to vary in future as well among these states in the light of their maximum expected and additional expected family size norms. The former is 5.1, 3.5 and 2.9 in U.P., A.P., and Kerala and the latter figure is 1.6, 1.4 and 1.1 respectively in these states. Therefore, the low parity couple in these states is likely to have 1.1, to 1.6 additional babies in the near future.

Implications: (i) Since fertility varies across different states, within districts of each state and among communities within each district, selective and differential inputs and strategies may have to be followed on the basis of these findings. The Population Control Programme may be decentralised and the district may be made the unit of planning and implementation of family planning programme in future. On the basis of fertility differentials, *districts may be considered for allocation of resources, planning and implementation of population control programme*. It is a viable and urgently needed change in our development strategy.

(ii) Intensive and special programmes may be mounted in selected districts/areas and communities, on the basis of high fertility, e.g., among the Fishermen, Muslims, and in all the backward districts.

(iii) Special studies may be promoted to identify high fertility areas and communities all over India to rationalise the inputs in future. This may be given as a priority of research to all the PRCs in India. Similarly, studies on determinants of additional expected family size norm may be promoted to identify the future high fertility areas and communities.

(iv) Knowledge on determinants of past high fertility may be used to plan the programmes and education in future at the district level.

(v) Selected and feasible experiences of Kerala's success in controlling fertility may be adopted in other states; Kerala's achievements may be widely disseminated among planners, administrators and peripheral workers in the rest of India. (For details see also Mahadevan & Sumangala, 1987).

(vi) Efficient peripheral workers from Kerala, Tamil Nadu and Maharashtra and Punjab may be deputed in U.P., Bihar, Rajasthan and Madhya Pradesh states with monetary incentives to promote family planning in high fertility and resistant areas.

(vii) Since sex ratio is in favour of females only in Kerala, lessons may be learnt from the experiences of Kerala for improving the health conditions of mothers, avoiding delivery problems and risk in life, and improving their status in general in the rest of India.

(viii) Since the population in U.P. and A.P., are relatively more young than in Kerala (see age pyramid) different programmes may be devised for different population in the light of their changing age structure over a period of time.

(ix) The present closed birth intervals in these states are less than three years, and it is detrimental to the health and growth of mothers and children. Therefore, greater emphasis may be given for spacing births through IEC programmes. Incentives may also be offered for spacing of births. Similarly, the open birth interval in U.P. is as low as 35 months as against 47 in A.P. and 49 in Kerala which reveals the differential impact of family planning in these states. Therefore, more efforts for postponing future births may have to be considered through the national programme in high fertility states like U.P.

Religion, Value of Children and Fertility

The population studied here include the Hindus, the Muslims and the Christians. The Hindus are represented by the forward castes, backward castes and the Harijans. Firstly among the Hindus, the Muslims and the Christians significantly differs within each of the states of U.P., A.P. and Kerala and among the three states as well. Even within the Hindus, fertility differs between the Harijans and the Caste Hindus. Interestingly, the Muslims have the highest crude birth rates in A.P. (43) followed by U.P. (30.7) and Kerala (28.4). While the Christians have the highest birth rate in A.P. (50), the Fishermen Christians in Kerala also have a very high fertility (38.7). However, non-fishermen Christians in the same state have the lowest birth rate (24). These differences in birth rates go against the general notion and are very valuable for the effective control of fertility among them.

Value of son prevails widely in all the three states. It is the foremost factor that increases fertility. A dozen major dimensions of value of children have been identified. They are: (1) economic support during old age; (2) better economic support to the family; (3) receiving dowry; (4) salvation for the parents; (5) continuity of family tradition (lineage); (6) inheriting family property; (7) becoming adult member in the society for status; (8) company for parents and children; (9) physical force for power; (10) for meeting other family obligations; and (11) physical force for the protection of old parents. Of these, old age security value is the most important dimension that increase fertility all over India. This cultural dimension of value of children is also very great in all the states. This value is extensive but relatively more important in U.P. and A.P. than in Kerala. On the other hand, daughters are disliked, mostly for the difficulty involved in paying the dowry, which is somewhat higher in U.P. than in A.P. and Kerala, despite the fact that child marriages are performed in U.P. for avoiding dowry. Generally the first son or last one is regarded in most states as relatively more important for old age security.

Implications: (i) Since birth rates are very high for the Harijans, the Christian Fishermen and the Muslims in general, intensive efforts and special programmes may have to be formulated to promote the fertility control programme among these priority groups all over India. Since the Muslims do not have high fertility in all the states and their fertility significantly varies across the three states, valuable lessons learned among the Muslims in this programme from Kerala can be effectively used in U.P. and A.P. Similarly, the lowest birth rate noticed among the non-Fishermen Christians may be a lesson for their brethern in A.P., where they have the highest fertility. A strategy to educate the Muslims in population control programme is given at the end of this chapter which may be effectively used to strengthen family planning among the Muslims in particular. Since the fishermen have the least education and very high infant mortality, the ICDs programmes may be extended soon to cover all the coastal areas in India. Incentives may also be increased for fishermen and such other high fertility illiterate population for obvious reasons.

(ii) Since old age security value is the most important dimension of value of children, a package of old age security programmes through the LIC, Bank, voluntary agencies, or other agencies may be started now which may mature only when parents attain the age of 60. Such a security policy may be made available to parents who stop with two or less children and have insufficient income to maintain a reasonable living during their old age. This scheme does not require any investment immediately, when it is offered to young and middle aged couples.

(iii) Since daughters are disliked mostly on account of the dowry problem and child marriage is followed in U.P. largely to avoid excessive dowry, suitable schemes may have to be evolved to make marriages less expensive. Dowry prohibition through law alone will not deliver the goods. In this context loans at a reduced rate of interest may be made available to parents who arrange their children's marriage at the legally prescribed age or later on. Such loans may be recovered on a long term basis or be written off if the married children give birth to only one or two children. But the amount can be realised with interest at shorter intervals of time from defaulters.

(iv) Most of the value dimensions can be used in different ways to evolve themes on population education to reduce their pronatalist influence.

Socio-Economic Status and Fertility

People of these three states have different socio-economic status. Considering the per capita income of these states, A.P. stands first, followed by Kerala and U.P. However, in the field of education, Kerala stands first followed by A.P. and U.P. Therefore, we can confirm that while economically A.P. is in the forefront, socially, Kerala ranks as number one and in both these aspects U.P. is far below the other two states. However, at the micro-level, the largest number of people in U.P. live in better houses (95%) followed by A.P. (76%) and Kerala (67%). Regarding the social structure of the family, more people in U.P. (28%) live in joint families than A.P. (20.5) and Kerala (16.5%). Hence social change in the family structure has taken place more in Kerala followed by Andhra Pradesh and U.P. Regarding the status of women and eradication of illiteracy among adult men and women, Kerala has achieved a spectacular success and leaves A.P. and U.P. far behind. While Kerala has only one-tenth of the adult men and women falling under illiterate group, their counterparts in A.P. constitute more than fifty percent, and of course less men (41%) and more women (85.6%) fall under this category in U.P. Extremely poor people with less than Rs. 5,000 per annum are more in U.P. (38%) much less in A.P. (20.5%) and Kerala (15.5%). Similarly, economically better off people with an annual income of Rs. 21,000 or more are more in A.P. (7.1%), followed by Kerala (5.9%). They are negligible in U.P. Occupational mobility among men and women is highest in Kerala and more or less equal for A.P. and U.P. Thus, most of these socio-economic indicators (except per capita income) rank Kerala at the top, followed by A.P. and U.P. Such socio-economic indicators, viz., house type, education, income and opportunity costs, differently influence fertility within each of the states and among them.

A negative association is noticed between the first three factors. However, opportunity cost is realised only after getting more number of children in most places. But these social changes are extensively noticed in Kerala followed by A.P. and U.P. Therefore, they have shown differential influence across these states and hence explain the existing inter-state differentials in fertility behaviour. Occupational mobility also depresses fertility, which is relatively more in Kerala than in the other two states. Thus, better socio-economic status and change promote decline in fertility depending upon the extent of improvement/changes noticed in the various dimensions of society.

Implications: Of the several socio-economic status variables, education of women and occupational mobility are the two major manipulable factors that deserve to be given the highest priority for reducing fertility and thereby improving the quality of life.

(i) Since mother's education is related to low fertility, greater attention must be given to women's education and their emancipation.

(ii) Similarly occupational mobility and migration may be encouraged as these factors reduce fertility. It is evident from the fact that even the less educated people migrating to the Gulf countries from Kerala and U.P. show very low fertility. In fact many of them are traditional groups like the Muslims and manifest high fertility. Therefore migration of people within India across different states at least may be encouraged.

(iii) Various dimensions of opportunity costs can be effectively used in population education to convince the resistant mothers in favour of family planning. Using these themes more popular literature can be produced and may be made use of as textbooks at the high school level under Social Studies.

Breastfeeding, Weaning and Nutritional Status

Nutritional status and breastfeeding vary considerably across these states. Intra-familial distribution of food varies among the people; in U.P. men get the highest priority (75%) and women the lowest. On the other hand, in A.P. and Kerala, only 20 percent and 43 percent of families respectively give priority to men in distributing food. Regarding the intake of three balanced diets per day Kerala stands first, followed by A.P. and U.P.

Breastfeeding and early weaning practices together show a highly significant relationship with infant mortality in Kerala but not in the other two states. While in Kerala weaning begins much earlier than in the other two states, i.e., as early as in third month, in A.P. and U.P. they begin at 6-7 months. Weaning practices show statistical significance only in Kerala and U.P., but not in A.P. In Kerala infant mortality is somewhat more at the early age of infancy at the weaning time. In the other two states it is at a later period of infancy because of the poor hygiene associated with the weaning practices. No doubt early weaning is good for the health of the baby but infection has to be avoided.

Initiation of breastfeeding during the first three days varies among these states. Most women in these states do not begin breastfeeding on the first day itself. However, more women do so in Kerala, followed by A.P. and U.P. Mean duration of breastfeeding is significantly more in U.P. than in the other two states. It is 25.4 months in U.P., 22.0 and 20.6 months in A.P. and Kerala respectively. Mean duration of the amenorrhoea period extends up to 11.6 months, 11.1 months and 7.9 months in U.P., A.P. and Kerala states. Periodicity of breastfeeding is also seen more in U.P. than in the other two states.

Taking the duration of breastfeeding and commencement of supplementary feeding, together it can be fairly concluded that U.P. has the longest duration of breastfeeding and lactational amenorrhoea because the mothers introduce the supplementary feeding very late. Therefore breastfeeding may be influencing fertility control to a certain extent more in U.P. than in the other two states. Though Kerala has the second longest duration of breastfeeding next to U.P. the period of lactational amenorrhoea, however, is shortest there perhaps because supplementary feeding begins in Kerala much earlier than in U.P. and A.P. Though the early weaning practice is advantageous for the health of the infants in Kerala it minimises the importance of breastfeeding as a natural fertility control measure. The eight months duration of lactational amenorrhoea period seen in Kerala also may not contribute much independently to the reduction in fertility, because in any case most of the women in Kerala, particularly in rural areas, remain in their parental home after delivery and therefore invariably will not be having any sexual contact.

Regarding the characteristics of women differently breastfeeding, the Muslims in general breastfeed for a short duration; it is also shorter among young women in general. A negative association is noticed between the education of wife and the duration of breastfeeding. Breastfeeding shows a negative association with fertility in all the three states. But such association is more pronounced when the duration of breastfeeding extends beyond one year. Breastfeeding in a limited way explains the intra- and inter-state variations in fertility.

While colostrum is given by over fifty percent of mothers in Kerala (59.3%) during the first two days after birth, only a quarter of mothers in A.P. (25.7%) and only one-fifth of them in U.P. (21.7%) do so. This practice may significantly contribute to the low infant mortality in Kerala as against A.P. and U.P.

Implications: (i) The long duration of breastfeeding acts as a beyond family planning measure because it increases the amenorrhoea period which prevents conception. Since young and educated women besides the Muslims have short duration of breastfeeding, greater attention may be given to educate them in particular to prolong breastfeeding. In this context a favourable custom followed by women, i.e., staying at the residence of their parents for a long duration after delivery may be encouraged.

(ii) Health education may be imparted to all mothers through whatever media possible to breastfeed the babies particularly during the first three days after delivery and on a long-term basis. By not doing it, in U.P. and A.P. very valuable colostrum is lost to the babies resulting in a poor immunity level to their childhood and frequent illnesses.

Family Planning

Family planning adoption is significantly higher in Kerala (33.5%) than in A.P. (28.4%) and U.P. (13.1%). Kerala's contraception rate is one of the highest, next of course only to Maharashtra (40%), Gujarat (36.9%) and Punjab (34.5%). Among couples with one child and more, 65.5 percent in Kerala, 48.6 percent in A.P. and 30.1 percent in U.P. have adopted one or other method of contraception. When the adoption level is considered in relation to the fertility behaviour of the couples in the three states, one finds that adopters in general have more children than the non-adopters; it is in excess by 0.9 child in U.P., 0.5 in A.P. and 0.3 in Kerala and 0.2 at the aggregate level. The low level of fertility coupled with higher level of contraception seen in Kerala as against high fertility and low percent of contraception in A.P. and U.P. explain the influence of contraception as a factor for the inter-state variations in fertility between the former and the latter two states.

District-wise adoption of contraception is again highest in the two districts of Kerala, viz., Trivandrum, Alleppey, and Guntur in A.P. and the Palghat district in Kerala in this order. All other districts of A.P. and U.P. have attained only a very low level of contraception for the couple with one and more children.

Religion and caste-wise also adoption varies significantly. Even among the Muslims, the level of contraception is significantly higher in Kerala as compared to their counterparts in U.P. and A.P. The trend is the same with regard to Christians and Hindus. The main religious objection to family planning is based on ignorance because an overwhelming proportion of women have reported that children are the exclusive blessings of God. More people with one or two children in Kerala than elsewhere have adopted sterilization. Education shows a direct relationship with adoption of contraception; this trend is more pronounced in Kerala and A.P. than in U.P. for obvious reasons. A similar trend is noticed in all the three states with regard to family income and cost of performing marriage. Differential value of sons seen across these states also contributes to the existing variations in contraceptive behaviour. Thus, a combination of cultural and socio-economic status differences are responsible for the existing differences in contraception within and among these states which may have to be tackled together for the promotion of family planning.

Demographically effective contraception is more common in Kerala than either in A.P. or U.P. which comes last. Greater proportion of young and middle aged women with less number of children have taken to contraception in Kerala than in A.P. and U.P. which comes last in this respect too. The duration of married life shows a direct relationship with contraception in U.P. and A.P. and a curvilinear relationship in Kerala. Adoption of contraception varies among the seven districts studied here and it varies between districts within a state and across different states. Opinion on ideal cash incentive for acceptance of sterilization shows an extreme situation within and between the states. In all the states most adopters and non-adopters desire a range of Rs. 200-600 which is more than double according to the present rate of incentives. While a higher rate of incentives is desired by more women in U.P., a lower rate is opted for by women in A.P., and no incentive or lower rate is preferred in Kerala.

Implications: (i) Differential input, strategy, and targets may have to be considered to tackle the high fertility state and communities in U.P. and other such states compared to low fertility states like Kerala, Maharashtra, Punjab, Haryana etc.

(ii) Greater efforts have to be put in to motivate couples with two and less number of children to accept contraception, besides tackling the high parity eligible couple for promotion of contraception.

(iii) An annual and cumulative achievements register on family planning by district-wise and community-wise may be maintained to evaluate the programme and ensure its balanced development in all the regions and communities.

(iv) It is time now to concentrate more on communities which lag behind in adoption of family planning. Therefore, *special programmes may be launched among such groups as the Muslims, Fishermen Christians, Harijans and tribals in this regard.*

(v) Religious leaders, Muslim priests and Christian priests, office-bearers of their community-wise associations may be given incentives and orientation training in order to involve them in the promotion of family planning. Concerted publicity of correct religious views of family planning may have to be made through all the available mass media and interpersonal channels of communication, e.g. taped conversations with religious leaders on family planning can be relayed through the AIR and so on (see more details on this in Chapter X).

(vi) Since opinion on ideal cash incentives for acceptance of sterilization varies in different states, suitable incentive schemes may be differentially followed in different states based on these findings. An increase in cash incentives is widely desired in most of the states and therefore doubling of the present incentive is necessary now to increase the acceptance rate of contraception, particularly among the poor and high fertility communities.

Determinants of Fertility of Older Women (≥ 35)

When a special analysis of older women (≥ 35) was carried out between any two states of the U.P., A.P. and Kerala, fertility differences emerged more among them than among the younger ones. The overall fertility differences among all the communities within each state range from 6.1 to 6.5 children in U.P., 3.9 to 6.5 in A.P., 3.1 to 4.2 in Kerala and 4.2 to 5.8 for the country as a whole. Fertility is highest among the Muslims in U.P. and A.P and the BC in Kerala. It is lowest among the FC in all the states and others have an intermediate level of fertility. However, in the country as a whole, the SC and ST have the highest level and the FCs have the lowest rates. There are nine probably important determinants of fertility chosen here for study, viz., religion and caste; value of children; educational status of the wives; age at marriage; replacement effect; survival insurance; contraception and breastfeeding. Of these only five factors, i.e., religion and caste, value of children, the educational status of wives infant and childhood mortality have shown significant relationship with fertility at all levels. However, contraception has mostly shown importance in depressing fertility in the Kerala state only. All other factors are not prominent to explain the variations in fertility, though some of them and even other factors that are not considered here also have a certain influence either directly or indirectly to explain the variations in fertility.

Implications: (i) Since the older couples belonging to the SC and ST, Fishermen and Muslims have the highest fertility and also mortality rates, a package of child survival programmes may be promoted among them along with family planning. Otherwise they will continue to lag behind in contraception even in future.

(ii) Special programmes may be introduced to tackle the religious and cultural objections to reduce the pronatalist effect of value of children and to improve formal and non-formal education of the middle aged and older couples since these factors constitute the major determinants of their high fertility. A package of programmes to manipulate all these pronatalist factors together may be considered instead of trying with piecemeal efforts on each items.

Interaction Between Mortality and Fertility

In part III of this book, a highly significant association between infant mortality risk and the consequent high fertility have been established. Such a relationship is more pronounced in the case of completed fertility as shown in chapter VII. The dimensions of mortality risk that show strong correlation with fertility are: (1) replacement effect, (ii) compensation effect; (iii) insurance effect and even perception also exist on high mortality conditions. They differentially influence fertility across the three states. It has more pronounced influence in U.P. and A.P, where mortality level is high but has much less influence in Kerala on account of her present low level of mortality. However, for older couples (≥ 35) such inter-state variation is not there.

Unwanted Children

It has been confirmed here that most women get unwanted babies, when they have additional child/ children to avoid the risk of mortality of the infants and/or children. Of course certain couples also have unwanted babies due to the failure to contraception and for several other reasons. The presence of one or more unwanted babies has been reported by 22.8 percent, 29.8 percent, and 31.4 percent of mothers in U.P., A.P., and Kerala respectively and 26.2 percent at the aggregate level. These findings vary across these states; they are perceived significantly more in Kerala and least in U.P. Among the various communities studied here most of the high fertility groups like the Muslims in Kerala, the scheduled caste and tribes in A.P., and the backward castes in U.P., have reported a very large number of unwanted babies. Generally the older women with completed fertility have reported more about the existence of unwanted babies. Educational and income levels of the mothers show an inverse relationship with the number of unwanted babies. A similar trend is noticed with the level of child labour in the family. Employment of child, however, reduces the feeling of mothers about the unwanted babies. When mothers felt that they have certain unwanted babies they think of contraception. Thus, most of the women in A.P. (55%) and Kerala (69.5%) have resorted to contraception but not so in U.P. (40%). Hence it is a strong motivating force for contraception.

Implications: (i) The concept of unwanted children can be suitably used as a theme for motivating reluctant couples to accept contraception.

(ii) Special care may be given to poor high parity couples and their children to avoid the neglect of unwanted children.

(iii) Unwanted babies may end up as child labourers and if child labour is suddenly stopped and feeling of unwanted babies may also grow more among the poor and high parity parents. Therefore this problem has to be tackled after devising suitable measures of education, employment and other schemes of rehabilitation for child labourers and unwanted babies.

(iv) Priority may be given even to parents with three and more children to accept contraception to prevent the development of the feeling on unwanted children in future.

Now it is beyond any doubt that for rapid and further decline in fertility we have to improve the survival chances and development of babies all over India. Therefore, a comprehensive package of programmes for the survival and development of existing and future babies may have to be developed soon for the success of family planning itself.

Differential Influence of Family Formation Variables: Needed Priority in Policy and Interventions

To ascertain the direct and indirect influence and individual influence of major determinants of fertility, 21 variables that showed, a clear association with fertility in the preceding tabulations have been subjected to correlation and regression analysis. Out of them eleven important factors have been considered for path analysis on the basis of their correlation co-efficients. The following variables have emerged as the most important determinants of fertility in the order given below, viz., (i) value of children; (ii) interval between baby that died and baby born (mortality effect); (iii) opportunity cost; (iv) education of wife and (v) breastfeeding. These variables are found to be important in all the three states but they rank differently in the order of importance in the three states which can be seen in Table 8.5 at the end of path analysis. However, another six variables, viz., type of family, religion, age at marriage, family planning and distance to the primary health centre (infrastructural) have shown considerable influence on fertility behaviour either in one or two states but not in all the three states. It does not mean that other variables that are found important in tabulations but could not emerge as important here are not necessary for understanding the total variations in fertility behaviour. These variables differently showed their direct or indirect influence on fertility in the three states. Thus, culture (value of children), infant mortality risk, opportunity cost, education, breastfeeding and the other factors shown above together explain the difference in the fertility behaviour in the states of U.P., A.P. and Kerala. These variables may be given the highest priority by suitable programme measures to reduce fertility in our country. Some of the policy issues to control these variables have been discussed in the preceding pages and many more have to be identified through further action research, experiences and thinking. Therefore, successful future policy and interventions to control high fertility in our country may be based on the factors as shown above in order of their importance and in the nature of their influence (see also Chapter X & XX) rather than on other arbitrary factors.

Certain aspects of the summary on determinants of mortality are discussed in Chapter XX except breastfeeding and interaction between fertility and mortality.

10

Strategies for Fertility Control Among Muslims

Development of communication and population education seem to be relatively difficult among the Muslim population, particularly in rural areas in India. Different views are expressed on this problem. Though nothing is found in the Quran and other religious texts of the Muslims against family planning, the Mullas and Moulvis interpret certain passages on sex and reproduction in the Quran, either partially or fully, as being against family planning. No doubt, the Muslim priests cannot face all the Muslims to toe their line on family planning since certain the Muslims have already accepted family planning. The Muslims with or without the influence of their priests continue to have, however, certain reservations in accepting family planning methods except perhaps coitus interruptus and abstinence. They consider it a sin and against Islam according to Prophet Mohammed. Nevertheless, most of the Muslims are ignorant about the references to sex, reproduction and family planning in the Quran. According to Kirk (1966), it is not the Muslim religion *per se* that is against family planning, but their culture and backwardness that makes them resistant to family planning. This idea was also confirmed empirically in a study conducted in Central India by the author (Mahadevan, 1983). Besides, there is the visible influence of the Muslim priest's wrong interpretation of the Quran against family planning. Against this background an effort is made in this paper to present the views of an eminent Mulla of U.P. on Islam's views on family planning. It is further substantiated by a Muslim family's case history related to the problem of acceptance of family planning. The role of certain Muslim organizations in discouraging family planning is also discussed. At the end certain recommendations are given for promoting successful communication and population education among the Muslims.

An Interview with Hakim Wassi Ahmed

Recently the author interviewed Hakim Wassi Ahmed, a famous Mulla and Unani doctor from Eastern Uttar Pradesh. Mr. Ahmed runs a popular Unani hospital called Aligarh Dhawakhana. Two of his sons, who are M.B.B.S. degree holders from Lucknow, are also practising Unani medicine along with their father. Mr. Ahmed is not only a popular Unani doctor but also a respected Mulla of the Muslims in three districts of Eastern U.P. As a Mulla he mediates, reconciles and resolves several family feuds and disputes which otherwise would have to be settled in a court of law. He is an accepted arbitrator for several disputes among Muslims.

The interview with the Mulla was facilitated by Dr. Khan, a local allopathic doctor. Hakim Wassi Ahmed was cordial, frank and friendly with this author in answering all questions and citing all evidences in an objective manner from the Quran.

Q. 1: Could you please explain the references made in the Quran directly or indirectly and for or against family planning?

Ans.: The concept of family planning has been there in Islam in different ways. There is a description about family planning and intercourse in the Holy Quran. Coitus interruptus is referred to as azl in the Quran. Prophet Mohammed has supported it for avoiding the difficulties of family and saving the life of women from the risks of pregnancy. Dr. Ahmed cited an illustration to show in what context, the Prophet had approved coitus interruptus. A certain couple approached the Prophet and sought guidance from him on family planning since they had many children and were suffering from several difficulties. The Prophet advised azl (coitus interruptus) to this couple for stopping future conceptions. The learned Hakim said there no dispute on this among the Muslims. Now the question is whether the Prophet suggested azl only to a particular family or to Muslims in general. According to him, the Prophet recommended azl for Muslims in general who had sufficient number of children and would like to stop procreation in future. Hence, it can be said that the Prophet recommended azl to all the Muslims. He further said that azl was a wajib (essential) to save the lives of all those who needed it.

Q. 2: Well, you said that coitus interruptus was recommended by the Prophet as a method of family planning. What other methods of family planning might similarly be acceptable to the Muslims in the light of the support given to coitus interruptus?

Ans.: Since Prophet Mohammed approved coitus interruptus we may conclude that other methods of family planning which do not kill a foetus can be used by the Muslims. The Quran only disapproves of the killing of foetus and children for any reason.

Q. 3: As you know, using condom, IUD, sterilization and several other family planning methods do not kill the foetus but only prevent its formation just like coitus interruptus. What is your view, therefore, on using the other contraceptives?

Ans.: Certainly there is nothing wrong in using condom, IUD and sterilization, except induced abortion.

Q. 4: Nowadays there are several Muslim women who resort to induced abortion, but are against the adoption of other family planning methods. In the light of sanction given by Prophet Mohammed to coitus interruptus and disapproval of killing foetus, don't you think that adoption of other family planning methods has greater religious approval than induced abortion?

Ans.: Since contraception does not kill any human being, and sperm and egg individually are not human beings, any method of contraception can be permitted but not induced abortion. Prophet Mohammed also approved sex in the normal way using the vagina but not perversions of sex. If the vagina is not used for intercourse it is a sin for the Muslims.

Q. 5: What is the Islamic interpretation of creation?

Ans.: We believe that the Almighty is a Khalique (one who creates) as well as a razique (one who gives food). The Prophet also said that one need not be afraid of the number of children because of poverty. Do not kill children on account of poverty. This reference of the Prophet is misinterpreted by certain Muslims as the Prophet's disapproval of family planning. It is not correct. He only meant not to kill the children after birth, that too, on account of poverty and it is not a disapproval of contraception.

Q. 6: Do you conclude that the Prophet is in favour of family

planning and only against abortion and infanticide?
Ans.: Yes, you are correct.[1]

However, a Muslim priest, whom this author met in 1983 in the Ramapuram village in Andhra Pradesh (Mahadevan, 1986), was directly discouraging family planning. He used to tell the Muslims that those who adopted family planning would go to hell after death. According to him, there are seven hells and heavens for the Muslims. All those who strictly follow the Muslim way of life will go to heaven. In the ultimate heaven, he says, beautiful houris can be seen semi-naked and enjoy life. Such a privilege will be lost by adoption of family planning. He interprets Islamic religion as being against family planning by citing baseless and wrong examples. One reason for his wrong interpretation of the Holy Quran is his low level of education. Owing to his objection, most of the eligible couples of over one hundred Muslim families in the Ramapuram village have not adopted any contraception. In Ramapuram the notion of hell and heaven is developed among the Muslims right from early childhood. Initially parents and subsequently priests inculcate the concept of sin in the minds of children. During the Friday prayer in the mosque at noon the priest generally discusses general topics like family planning and what action would lead a Muslim to heaven/hell. According to the priest in Ramapuram it is the nature and seriousness of sin committed by Muslims that will lead them eventually to lower or higher level of hell. He believes and propagates that acceptance of family planning is one such serious sin.

Case Study of Muslim Health Worker

The following pages discuss (1) a case study of a Muslim family and the problems of women in the same family who underwent sterilisation, and (2) the efficiency of a Muslim worker in promoting family planning. Adoption of family planning by the first couple of that family led to the denial of its legitimate share of family's property, and brought about the breakdown of interpersonal kinship. For the second couple, sterilization led to the filing of a divorce case by the husband. The case study of Mrs. Zia Khattum's family manifests: (1) the familial attitudes and problems of Muslims in the adoption of family planning, and (2) distorted interpretation of Prophet Mohammed's views on family planning. The case study of the same female health supervisor, a Muslim (Mrs. Zia) provides many valuable ideas for strengthening communication and education by other change agents among resistant the Muslim clients.

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[1] Though the preceding interview relates to an individual priest, his area of operation and influence extend to at least three districts and more than three million population. Therefore, the findings reflect not a single case but a large population.

Mrs. Zia Khattum, aged thirtynine, belongs to the Barabanki District of Uttar Pradesh. She is the second daughter of Abdul Aziz and Rahuman who had eight children, i.e., one daughter and seven sons. Mrs. Zia got married at the age of fourteen and conceived in the third month after marriage. At 15, she got her first child. Subsequently, she delivered the second child at the age of eighteen and the third at twenty three. Her third child is a daughter and the remaining three are sons. All her deliveries, except the third, were held at the district hospital Barabanki. She has passed school final and her husband has studied up to the fifth class. She got the job of Health Worker (Female) when she was pregnant for the fourth time at the age of 28. Her husband was unemployed at the time of her marriage. Her first posting was in the Barabanki district. When they set up their independent family near her place of work, her husband started a tailoring shop. He used to get Rs. 300 to Rs. 400 from his profession. After completing seven years of service as ANM she was promoted as a Health Supervisor.

Her parents-in-law tried to persuade her to resign her job soon after her marriage, but she refused. She was happy to pursue her job. The relationship between her husband and her in-laws got strained slightly on this issue, and therefore, they moved out of the in-law's house to establish a separate household. She wanted her husband to move out of his parents' house and live separately or to permit her to live separately. Finally they opted to live separately from her in-laws.

After her fourth delivery, she unilaterally decided to undergo sterilization and did not tell even her husband about her decision; of course, she discussed the matter later on with her husband. He was also against sterilization she pleaded with him and asked" who will look after the children when I go to work? And if we get more children we will suffer". She further explained that the difficulty of looking after the children would be greater with more children and he would have to share the burden of looking after them. Subsequently the husband agreed with her decision.

Finally, she underwent sterilisation. Having come to know about it, her parents-in-law and parents quarrelled with her; they stopped visiting her and gradually disowned her and her husband. Because of her sterilisation and the latter decided not to give any share of their property to her husband. Thus, family planning adoption deprived her husband of his share of parental property.

Another interesting development took place in her family circle. Her eldest brother's wife Mrs. Naima adopted sterilisation on her own six years after Mrs. Zia got sterilised. Mrs. Zia influenced her sister-in-law to adopt sterilisation. A parallel problem was created for Mrs. Naima also. Her husband, who runs a welding shop in the Barabanki district, was not present when Mrs. Naima got herself sterilised. At the time of her sterilisation, she had one daughter and two sons. Her husband was against sterilisation. After sterilisation, the relationship between the husband and wife got strained, and therefore, she had to stay with her parents for about eight months.

Normally after the delivery, she should have been taken home by her husband at least after six months. But it did not happen now. Instead, her husband filled a divorce case against her in the Court of Law. During this period, Mrs. Zia interfered and mediated and resolved the conflict. Mrs. Naima had studied up to the sixth class and she is fairly well-informed and modern. She was anxious not to lower her prospects by getting more children. She also decided to adopt sterilisation to keep up her standard of living. This is the second unfortunate incident in the same family resulting from the adoption of family planning.

However, sterilisation of these two women in the family has in some measure liberalised the attitude of their relatives towards family planning. Mrs. Zia's younger brother told her that he would permit his wife to undergo sterilization after the third child, provided Mrs. Zia obtained a baby for adoption from the neighbouring hospital for one of the brothers who does not have children. Mrs. Zia has promised to do so. Therefore, her fourth younger brother's wife is likely to undergo sterilisation in the near future.

Mrs. Zia is working at a place 200 kms. away from her house in Nathanagar Block in the Basti district. She goes once in a month to her husband for a couple of days' stay. She feels that her two establishments affect their financial position. She has been longing for a transfer to Barabanki but has been unable to get a transfer so far.

Successful Strategy by a Health Worker

On Mrs. Zia's initiative several Muslim women have adopted sterilisation. She has motivated 30 Muslim women so far and got them sterilised. In the past, several women ran away from the hospital out of fear even though they had agreed and gone to the hospital for sterilisation. She was criticised by the hospital staff and the clients when they ran away from the hospital. Therefore, she changed her strategy later on. She used to take the clients personally to the hospital, remain there till the sterilisation was over, and then accompany them back home. Further, she gave very good follow-up and made all the adopters satisfied. Certain satisfied adopters were also used by her for promoting the programme later on.

When the Muslim women raised religious objections against family planning, she counter-argued, saying that though Allah did not allow abortion, many Muslim women had resorted to it, whereas sterilisation did not involve any killing of foetus. Hence, according to Islam there was nothing against sterilisation. She said her strategy of argument really worked very well with the Muslim women in setting aside their religious objections to family planning. Another effective strategy was revealing to the clients, that though she herself was a Muslim, she had adopted sterilisation and there was no objection from her fellow Muslims. This strategy also worked very well. All the efforts of Mrs. Zia have made her a successful Health Worker and she feels no difficulty in motivating the Muslim women to adopt sterilisation.

She also had to face resistance to immunisation out of fear from Muslim women. She found immunisation of Muslim children at school was much easier than doing it at home. At home, old men and women stand in the way of giving immunisation but at school with the co-operation of the teachers it is possible.

On infant mortality, she said it used to be high among Muslims for several reasons. Home delivery is very common among Muslim women. They are soared of hospitals for delivery thinking that they may be sterilised there without their knowledge. At the hospitals they are seldom educated by the staff. She herself has seen parents giving unboiled water to babies, which may cause diarrhoea. During pregnancy, many Muslim women get oedema, eclampia and anaemia. Fasting during Ramzan, etc., affects pregnant women and the foetus. Besides fasting, too much vomiting during pregnancy, and poor quality of food intake lead to nutritional deficiency in them. Muslim women avoid hot foods during pregnancy. Hot foods according to them include jack-fruit, papaya, meat, fish and egg. Distance to hospital discouraged women from going there during pregnancy and delivery time. The feeding bottles and nipples which they use are very often not kept hygienically, which causes disease. Muslim women have short birth intervals which affect their health and the babies receive insufficient care from the mothers. They are unable to look after too many small children at a time.

Control of Muslim Organisations

There are five major Muslim organisations in U.P. which are to be educated to strengthen our national population control programme among the Muslims. They are: (1) Muslim Majlis, (2) Jamia-Ul-Ulema, (3) Amarath Shariah; (4) Jamayethe Islami and (5) Muslim Education Society. The first four of these organisations have been directly and indirectly doing certain propaganda against population control through distribution of pamphlets and other literature. It was confirmed by Dr. I. A. Khan, a PHC medical officer in U.P. Therefore, there is greater need to orient the office-bearers of these organisations on correct perceptions and concepts of Islam concerning population control. There may be Muslim organisations in the other parts of our country which also may have to be identified and brought under the control of effective population education. They have to be convinced by citing the examples of Egypt, Indonesia, Pakistan and other Muslim countries where the family planning programme is being promoted. Periodic short term orientation courses to the chief office-bearers of these Muslim organisations will go a long way in stopping their adverse influence on the population control programme, particularly among the members of such organisations.

Communication and Population Education

The preceding two case histories of an important Muslim leader-cum-doctor ànd an family planning adopter-cum-change agent in health and family planning provide valuable ideas for strengthening communication and education on population control among the Muslim population. While the Muslim priest from Andhra Pradesh firmly believes that the adoption of family planning deprives Muslims of chances of reaching heaven, his counterpart from U.P. does not find anything wrong in accepting contraception though he is opposed to induced abortion and infanticide. Thus, we see the need for further research into the extent of the interference of Muslim priests against family planning. Further there is an urgent need for teaching all Mullas and Moulvis about the importance of population control. There is also an urgent need to involve the Muslim religious leaders in the family planning programme in different ways to generate confidence and give clarification to most of the confused issues of the role of Islam in population control.

How shall we involve the Mullas and Moulvis in promoting the health and population control programmes? As a first step, we should impart necessary knowledge to them of the essential aspects of health and population control through repeated orientation courses. Secondly, group meetings could be arranged between the Mullas and Moulvis with a limited number of other enlightened Muslims and workers of population control to disseminate the correct views on Islam's support to population control. A third strategy may be to print in Urdu, Arabic and the local language the contents of interviews with selected leading Mullas and Moulvis, like the one given above, in the form of pamphlets along with their photographs and distribute them freely to all the Muslims. Such interviews could also be relayed through the radio, television and the newspapers.

Since Muslim peripheral lady workers (H.W.F.) are found to be successful in convincing Muslim clients, there is need for appointing and posting Muslim workers in areas where their population is in substantial numbers. Highlighting of the non-approval of induced abortion and infanticide by Prophet Mohammed and acceptance of family planning in the Quran in the light of evidence given above will be effective in communication on population education.

In view of several Muslim women being somewhat self-motivated to limit the family size, there is an urgent need to establish hospitals in Muslim areas and provide suitable facilities for delivery. When they come for delivery at the hospital, education and motivation for sterilisation are against family planning would not be present there. A counselling programme at the hospital to both husband and wife by a change agent may succeed in minimising the resistance of husband also to contraception.

Education may have to be extended to Muslim organisations too to persuade them not to issue leaflet, against population control. Major Muslim organisations that have to be controlled in this context are: (1) Muslim Majlis, (2) Jamia-Ul-Ulema; (3) Amarath Shariah and (4) Jamayethe Islami. Muslim educational institutions (MES) can be motivated to issue pamphlets in favour of population control as the MES in India is an influential and progressive organisation. Extension of education to dropped out girls and boys from school is another factor which deserves special consideration. Thus, implementation of the preceding eleven suggestions can be make population education successful among the Muslims without any further loss of time.

PART-II

MORTALITY AND LIFE AFFECTING VARIABLES

11

Trends and Differentials in Infant Mortality

– K. Mahadevan & (Ms) T. K. Vimala

For the analysis of infant mortality we have considered the total number of dead infants of the couple. They include 1249, 672 and 366 infants who died in the entire sample population in U.P., A.P. and Kerala respectively. They were studied to analyse the trends, differentials and determinants in these three states. Since child mortality is very low across these states for this sample size, it has not been discussed here for the present. However, certain references about them are made at the beginning of the discussion. Infant mortality is computed separately for the three states and for the country based on the sample from the limited study area of three states. Added to these, state-wise rates are also calculated on the basis of caste and religion in all three states and this is a rare feature in most of the earlier studies. These rates can be relied upon for the respective districts and to a certain extent for the states, but not for the country as a whole for obvious reasons. However, the rates are fully dependable for A.P. and Kerala since extreme districts were covered under the study from these states. Though the same principle is applied to U.P. there might still be certain drawbacks because the two extreme districts studied may not be sufficient to represent the diverse ecological variations noticed in this state in view of its large size. But from the other two states such extensive variations in ecological factors are not anticipated. Therefore, we expect certain limitations in reflecting the IMR of the present study for the state of U.P. as a whole. No doubt, the figures represent fully the districts that we have studied.

Infant mortality rate by 1984 came down to 117, 85 and 32 for the states of U.P., A.P. and Kerala respectively, accounting for significant variations in IMR in these three states. The same trend prevailed in these states by 1980. The rates, according to the SRS, were 167, 103 and 41 and, by 1981, 157, 93 and 40 respectively. A comparison of the SRS data for the year 1980 and 1981 manifests an unrealistic picture of decline of IMR in the U.P. and A.P. states. During a gap of one year, the IMR has dropped by ten points in these two states as against only one point in Kerala, which is difficult to believe. While comparing the SRS data of 1981 with the present findings we notice that there is a decline of 40 points of IMR in U.P. from 1981 (SRS) to 1984 which again does not conform to the normal pattern of decline. However, in Kerala and A.P. the decline in IMR during the same period accounts for only 8 points each which may be possible during a span of 3 years. Therefore, the infant mortality rates for Kerala and A.P. given here based on the limited districts more or less reflect the present state of infant mortality rates. However, the same seem to be much lower when compared to the state figure of U.P. for the reasons mentioned earlier (see Table 11 to 11.3).

Infant mortality rates given for different districts in U.P., A.P. and Kerala confirm significant differences among the districts of the last two states, but not in U.P. Between the districts in the three states also, striking variation in IMR is noticed. While the Trivandrum district has the lowest IMR of 33, the Jhansi (117) and the Gorakhpur (116.7) districts in U.P. manifest the highest rates of infant mortality. In Andhra Pradesh, the Kurnool district, which is a backward area, has an unexpectedly low IMR of 71 as against an IMR of 108 in the Guntur district, though it is far more developed in all aspects than Kurnool. These unexpected findings might be due to the extensive water-logging noticed exclusively in Guntur and the lifestyle of the people there. However, further study is needed to establish the determinants of differential IMR noticed between the extreme districts within each state and among the different states. Unlike the state figures, IMR computed based on the limited number of district figures, the rates given for each district can be fairly relied upon.

Further, computation of IMR according to religion among these three states also manifests definite variations within A.P. and Kerala, but not in U.P. A comparison of the infant mortality rates of the Muslims, the Christians and the Hindus would reveal that the Hindus manifest lowest infant mortality in U.P. and Kerala but a moderate level in A.P. The highest IMR in all the three states noticed for the Muslims in Kerala (64.5) and U.P. (120) and for the

Christians in A.P. (143). The Muslims in A.P., however, manifest the lowest IMR among all other communities which is an unexpected finding. The Christians in Kerala (34) manifest moderate infant mortality, among all the communities of Kerala. Several factors, including variations in nutritional status, socialisation, cultural differences, socio-economic status and utilization of appropriate health care facilities, etc., which have been discussed in detail in the in-depth study of the three villages from these states, might explain the salient causal factors for this finding (see Table 11.2).

A comparison of the present findings with the SRS data of 1978 would reveal that they agree in a limited way with the trend discussed above. According to the SRS data, the Christians of Kerala have the lowest infant mortality rate. But the Muslims have the highest rate only in A.P. rather than in Kerala and U.P. The SRS data also show that the Caste Hindus have the lowest infant mortality in Kerala and A.P. states but not in U.P. The Harijans have the highest IMR in Kerala, the second highest in A.P. (next to the Muslims) and the highest in U.P. The discrepancy noticed in the SRS especially for the Harijans' infant mortality might be due to the differences in the classification of various sub-castes included under the Harijans. Of course, there cannot be exactly similar trends in the findings between the present study and the SRS because the SRS covered a large sample and not just two districts each from the three states. The religion-wise variations in infant mortality and its district-wise variations among the three states point out the need for evolving a differential strategy based on geography and the community all over India to tackle this problem realistically. A change in the present uniform programme to control infant mortality all over India is recommended based on the present findings.

Table 11: *Aggregate IMR for States and India from the Present Study and SRS*

	From present study (1984)	SRS rates for:	
		1980	1981
Kerala	32.02	41	40
A.P.	85.11	103	93
U.P.	117.04	167	157
India	86.63	124	119

Table 11.1: *IMR by Districts in Kerala, A.P. and U.P.*

States	Districts	IMR
Kerala	Trivandrum	33.33
	Palghat	45.20
Andhra Pradesh	Guntur	108.28
	Kurnool	71.43
Uttar Pradesh	Jhansi	117.39
	Gorakhpur	116.73

Table 11.2: *Infant Mortality Rates according to Religion on the basis of the Present Study (1984)*

Religion	U.P.	A.P.	Kerala
Hindus	116.27	80.12	23.44
Muslims	120.00	78.95	64.52*
Christians	-	142.86	34.09*

*Number of infant mortality is less.

Table 11.3: *IMR – SRS Rates for the Year 1978*

Religion	Kerala	A.P.	U.P.
Caste Hindus	45	118	174
Muslims	43	139	163
Christians	27	119	
Harijans	85	132	180

Source: Survey on Infant and Child Mortality, 1979, pp. 30-31, 73-140 (Statement 29 to 33).

Mortality Differantials

Family-wise proportion of infant mortality varies across the three states; it is the highest in U.P. (39.6 %), followed by A.P. (24.4 %) and Kerala (11.3 %). At the national level a quarter of the families experiance infant mortality. The same trend is seen in early childhood (1-4 years) mortality across the three states; but the rate is markedly lower than that of infant mortality in the states of U.P. (20.2 %), A.P. (16.4 %) and Kerala (4.6 %). Childhood mortality is the highest in A.P., followed by U.P. and Kerala. The combined occurrence of infant and childhood mortality also shows a similar trend to infant mortality. While over fifty percent of the families in U.P. experienced one or the other mortality, it is significantly less in A.P. (379 %) and Kerala (15.3%) families. Prevalence of mortality in Kerala is only less than one third of the incidence in the U.P. state and less than half of it in the A.P. How is such a tremendous difference in mortality noticed in these three states? Why is child mortality more in A.P. than in U.P.? These are important new research questions and issues for devising appropriate interventions for the control of these differential trends in infant and childhood mortality. These findings point out the existence of different types of factors and their influence on infants and children across these states (see Table 11.4).

It is confirmed here that since infant mortality is greater than childhood mortality, the determinants of mortality might be different for these two types of human wastage in different places. In an earlier study we had confirmed that different groups of factors influence infant and childhood mortality. "Considering the preceding discussion and comparing the causes of death of infants and children, it may be generalised that infant mortality is caused largely through bio-familial factors and the childhood mortality by the familio-environmental variables" (Mahadevan, *et al.*, 1985).

Considering the diferential trend in these human wastages, it is fairly certain that the prevalence of these factors are widespread in U.P., less in A.P. and lowest in Kerala. Because of widespread education, availability of health facilities and their utilization and better sanitation, these vital events might have been reduced to a minimum in Kerala state. The facilities of health delivery systems are moderate in A.P. and limited in U.P. on account of the differential socio-economic development and several other "Life Affecting Variables" (LAVs). These hypotheses have been examined in the section that follows.

When we examine the mean infant mortality experienced by the couple, the same trend is noticed across these three states. While 0.6 infants died in U.P. state, it was 0.3 in A.P. and 0.2 in the Kerala state for the respondents. This trend is based on the

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Table 11.4: *Percent of Infant and Child Mortality in the Families, and Mean Mortality in the U.P., A.P. Kerala and India*

	U.P.		A.P.		Kerala		India	
	*Mortality in the families	**Mean mortality per couple	Mortality in the families	Mean mortality per couple	Mortality in the families	Mean mortality per couple	Mortality in the families	Mean mortality per couple
Infant Mortality (≤ 1 year)	39.6 (792)	0.6	24.4 (488)	0.3	11.3 (282)	0.2	24.0 (1562)	0.4
Childhood mortality (1-4 years)	20.2 (403)	0.3	16.4 (328)	0.2	4.6 (114)	0.1	13.0 (845)	0.2
Childhood mortality (5-14 years)	5.7 (114)	0.1	4.2 (83)	0.1	1.5 (37)	0.02	3.6 (234)	0.04
Infant and childhood mortality (-14 years)	51.2 (1024)	1.0	37.9 (758)	0.6	15.3 (382)	0.2	33.3 (2164)	0.6

*Percentage of families is calculated with the respective sample size of the states (i.e., U.P. = 2000, A.P. = 2000, Kerala = 2500 and India = 6500).

*Means calculated with respective sample size of the states.

The total under the families in different columns may not tally, since infant and childhood mortality might be there in the same family.

cumulative infant mortality of the couple and therefore would not be fully in line with the present trend in mortality in these states. Even then, the differences are significant between U.P. and Kerala but not between Andhra Pradesh and Kerala. This is because the mortality trend does not reflect the recent phenomena but shows the cumulative trend over two or more decades. Considering the mean early childhood mortality (1-4 years) more died in U.P. (0.3) and fewer in A.P. (0.2) and Kerala (0.1). The differences in mortality of children between 05-14 years are also there among these three states; it is 0.1, 0.1 and 0.02 respectively from the north to the southern states. The human wastage of young people in U.P. is almost twice that of Kerala. These findings may be an eye-opener for the planners and policy-makers of the respective states and those at the national level to create scientifically differential inputs for the effective control of infant and childhood mortality. Since A.P. manifests more childhood mortality than U.P., which is surprising, further research is needed to identify the higher to unknown major determinants of childhood mortality in A.P. These findings go against the general notion that the U.P. has the highest infant and childhood mortality, compared to all the southern states. The fact that the number of babies who died and also per family is highest in U.P. followed by A.P. and Kerala, requires a different emphasis in the programmes based on the determinants of mortality, which we are going to consider shortly (Table 11.4).

12

Demographic Variables

– K. Mahadevan & B. P. Reddy

AGE AT DEATH OF INFANTS

Age at death of infants, whether on the same day of birth or within a week or at any time during the neonatal period, has very great relevance for discovering the salient determinants of infant mortality in different contexts and at different stages of their development. Therefore, the table given below is formulated with the culturally important events in terms of the overall socialization process that is being followed differently in our country. The death occurring on the same day or soon after delivery might be largely due to biological reasons and improper delivery care. When death occurs subsequently, social and cultural factors might play greater roles.

About 15.4 percent of infants in general have died in all the places on the same day after the delivery. Such incidence of mortality does not differ much across the three states. In all probability, so many deaths might have taken place (i) on account of the poor health of the mother and (ii) the improper delivery care given by the untrained *dais* or by relatives. Added to these deaths, nearly 40 percent of the infants died within 7 days after the delivery. The percentage of such deaths is higher in Kerala (44%) and A.P. (43.1%) than in U.P. (35.3%). This is a surprising finding because the infant mortality rate in general is highest in U.P. (IMR 150) whereas it is 86 in A.P. and 37 in Kerala.*[1] What might have contributed to the lower percentage of perinatal mortality in U.P. than in the other two states? This is a major topic for research now. Of course, many of these deaths would have happend during the past one or more decades when the socio-economic situation was different in these states (Table 12).

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[1] *SRS, 1981: Vital Statistics Division, Office of the Registrar General, India. Ministry of Home Affairs, New Delhi.

When we examine the incidence of infant mortality from the first month to the end of the year, we find that the preceding trend is reversed in U.P. state compared to that of A. P. and Kerala. Towards the end of infancy, significantly, higher percentage of infants died, particularly in U.P., and just a few more of such deaths occurred in A.P. than in Kerala. This fact again requires further research for understanding the major causes of infant mortality. There are many possibilities. The initial low percentage of perinatal and neo-natal mortality in the state of U.P. may be on account of the better health status of the mothers there in the past. In fact, according to the information available in the past, women in U.P. used to consume more calories and protein than their counterparts in A.P. and Kerala. However, this situation has changed in the recent past. A study of a sub-sample of women and children carried out along with this study in these states on their nutritional status has revealed that in Kerala the pre-school children and their mothers have the least protein and mineral deficiency, whereas it is at a moderate level in A.P. and at a fairly high level in U.P. (see the findings in the last section of the report). Therefore, the past trend is higher incidence of neo-natal mortality in Kerala than in U.P. may be reversed from now onwards, which a future study may reveal. The reasons for higher incidence of infant mortality during late infancy in the U.P. and A.P. states may be because of the poor hygienic conditions and environmental sanitation prevailing in these states as compared to Kerala as well as several other probable life-affecting variables.

The demographic variables considered here for their influence on infant mortality are the age of the mother, age at birth of the first baby, number of live births, birth order of the baby, extra-children desired, unwanted babies born, the birth interval between the living baby and the baby that died. All these variables are found to have a significant correlation with infant mortality in all the three states. Of these variables, age of the mother, desire for extra children and number of unwanted babies born are positively correlated with infant mortality in all the three states and the rest of the variables such as a age at first birth, birth interval and replacement effect are negatively correlated. In the order of importance, the

Table 12: *Percent Distribution of Infant Deaths by Age at Death in the U.P., A.P., Kerala and India. It is a cumulative death throughout the repor-ductive period.*

Age at death	U.P.	A.P.	Kerala	India
≤ - 7 days	35.3	43.1	44.0	39.0 (892)
8 - 28 days	20.2	17.1	24.3	19.9 (456)
1 - 3 months	14.9	17.6	10.9	15.1 (344)
4 - 12 months	29.6	22.2	20.8	26.0 (595)
Total	100.0 (1249)	100.0 (672)	100.0 (366)	100.0 (2287)

number of live births is highly correlated with infant mortality in all the three states. It is only natural that when many children are born to the common man under the existing poor socio-economic conditions, the greater will be the chance of infant mortality. Followed by the number of live births, birth order of the baby that died shows an equally positive correlation in all the three states. The third important variable that showed positive correlation is the number of unwanted babies perceived by the parents. It is found to be more important in U.P. and A.P. than in Kerala, because fertility is very high in these two states when compared to Kerala. When more unwanted babies are born, it is natural that the parents may neglect them in the overall process of socialisation and this may ultimately lead to their deaths. The correlation co-efficient on age of the mother is more in U.P. than in other two states because the women in U.P. marry young and continue to reproduce for a longer period. Another variable that showed positive correlation with infant mortality is the desire to have more children in order to compensate for the possible loss of babies. Though it is important in all the three states, the correlation co-efficient, unusually, is found to be greater in Kerala and A.P., which is surprising in view of the existing high nfant mortality in the U.P. state. The variables, viz., the interval between the living baby and the baby that died and age at first birth uniformly showed negative correlation with infant mortality and

Table 12:1 *Correlation Co-efficient of Different Variables with Infant Mortality among the Tthree States*

Demographic Variables	U.P.	A.P.	Kerala
Respondent's age	.282	.191	.213
Age at first birth	−.156	−.152	−.140
Number of live births	.506	.421	.451
Extra children desired (compensation effect)	.216	.518	.675
Birth interval between the living baby and the baby that died	−.453	−.348	-.511

they are statistically significant. The former variable is more strongly correlated than the latter. The influence of the birth interval on infant mortality is seen to be greater in Kerala and U.P. than in A.P. Age at first birth shows the highest influence in U.P. followed by A.P. and Kerala in this order.

13

Socio-Cultural Situation

– K. Mahadevan & S. Parameswaran

Among the states studied here, the socio-economic development that has taken place since Independence is remarkably high in Andhra Pradesh and Kerala and much less in U.P. Transport, communication and infrastructural facilities are extensively developed in Kerala followed by A.P. and U.P. However, the per capita income is the highest in A.P., followed by Kerala and U.P. Similarly, literacy of women is the highest in Kerala followed by A.P. and U.P. These dimensions of development cumulatively suggest that Kerala is far more advanced in the field of social development and social change than A.P. and that of U.P. comes last in this regard. The same is described in detail under the section on socio-economic status and fertility. The influence of social and cultural factors on infant mortality, therefore, may have to be considered in the context of the significant variations observed in social development and social change in these three states. A few major socio-cultural variables have been considered in order to analyse their differential impact on infant mortality. They are: religion and caste, family type, mother's education, father's education, family income, and fasting during pregnancy.

Religion and Caste

Religion and caste significantly influence mortality on a differential basis within each state and across the three states. Within U.P., mortality is the highest for the scheduled castes and tribes (SC/ST), followed by forward castes (FC), backward castes (BC), and lastly the Muslims. It is a historical trend and therefore need not reflect the IMR of any particular year. In A.P., on the other hand, it is the highest among the Muslims, followed by the BC, SC/ST. It is the lowest among the FC. In Kerala, it is the highest among the SC and ST, followed by the Christians and Muslims and the BC, and lastly the FC. Christians are larger in number in Kerala than in other two states; even among the Christians, infant mortality is much higher among the fishermen Christians than the hinterland Christians, which can be seen under the section on trends and differentials of infant mortality (table not given). A comparison of the incidence of mortality among these groups across the three states reveals that it is the highest for the SC/ST in U.P. and Kerala and for Muslims in A.P. It is the lowest for Muslims in U.P. and for the forward castes in A.P. and Kerala. All other gropus fall in between them. These differences cannot be explained with reference to any single factor but are caused by a combination of several factors. The differential socio-economic status, social change and cultural variations of these communities together may explain a great deal of the difference in infant mortality across these communities. In this context, it is well known that Muslims and the SC/ST are relatively more backward and traditional than the BC and FC in these three states. Fertility is also the highest among these two cultural groups (see Table 13).

Table 13: *Percent Distribution of Respondents according to Infant Deaths and Caste/Religions in U.P, A.P, Kerala and India.*

	Infant deaths			
Caste / Religion	U.P.	A.P.	Kerala	India
Muslims and Christians	30.7 (120)	29.0 (108)	13.8 (120)	21.3 (348)
SC / ST	43.7 (252)	25.7 (98)	15.1 (42)	31.7 (392)
BC	40.0 (248)	27.2 (135)	10.8 (94)	24.0 (477)
FC	41.7 (172)	19.6 (147)	5.5 (26)	21.1 (345)

Fasting during Pregnancy

Occasional fasting for a day or more during pregnancy and lactation period is very common among most communities in India. It may be for religious or for other reasons. Prolonged fasting for more than a day may cause health hazards for the mother and the baby during pregnancy and lactation. Such fasting is more common in U.P. than in A.P. and Kerala. The pattern of fasting also varies from no food to liquid food, from once to twice per day. These differences are also more in U.P. than in A.P. and Kerala. In all the states and also at the aggregate level, the proportion of infant mortality has definitely increased among the mothers as a result of fasting (χ^2 for 2 d.f. is highly significant). However, the proportion of people fasting is remarkably high in U.P. (65.5 %) followed by Kerala (10.3 %) and A.P. (2.7 %). At the aggregate level a quarter have resorted to fasting (24.9 %). Hence the extensive influence of fasting seen only in U.P. but it is noticed only among a tenth of the population in Kerala and is negligible in A.P., which may also cause certain inter-state variations in infant mortality (Table 13.1).

Table 13.1: *Percent Distribution of Respondents according to Infant Deaths and Fasting during Pregnancy and Lactation in U.P., A.P., Kerala and India (Pooled)*

	Infant death			
Fasting	U.P.	A.P.	Kerala	India
Fasting	41.1 (538)	35.9 (19)	18.6 (48)	37.4 (605)
No fasting	36.8 (254)	24.1 (469)	10.4 (234)	19.6 (957)

χ^2 = 589.1 for 2 d.f. (highly significant).

Fasting during Pregnancy and Weight of Infants

In this context the data relating to the mean weight of the infants during the first four months was screened across the three states as per three levels of fasting. Three levels are: fasting, semi-fasting and no fasting. The information is given in Table 13.2. It is observed that in U.P., where fasting is intensive as well as extensive, mean weight of infants during the first two months is lower in fasting and semi-fasting cases as compared to that of no fasting. Between fasting and semi-fasting the weight of infants is moderately higher in the case of semi-fasting. Between two and four months, however, this trend is not evident.

In A.P. and Kerala where fasting is not practised as extensively as in U.P. the weight of the infants does not seem to be affected by the level of fasting. The number of cases occurring at different levels is also small. These findings suggest that consistent fasting during pregnancy as happened in U.P. may have an impact on the infant, in the early stages of life as observed by weight recorded. At later stages of life due to other environment factors this effect may not be so clearly observed. Birth weight would have indicated more precise effect with regard to fasting. However, it was not possible to obtain such data in the present macro-study relating to rural areas where birth weights are not recorded due to domiciliary delivery, memory lapse, and other factors. A longitudinal study over a period of two years beginning with conception and ending with one year after birth of infants covering dietary practices, MCH care, anthropometric and clinical assessment of mothers and children in different regions of the country would provide valuable information and will help in formulating policies for the development of the mothers and children.

Type of Family

Family type is classified into exclusive extended family, transitional family (nuclear family with additional members) and nuclear family. Infant mortality shows a direct relationship with these variables. In other words, infant mortality is the highest in nuclear families in all the three states and lowest in joint families. It can be explained on the basis of differential socialization patterns that might exist in joint and nuclear families. It is natural that infants will be given more personal attention and care in a joint family because of the availability of other members who would be absent in a nuclear family. Since infants are more vulnerable to infection than children, more personal attention and care given by relatives to them may reduce the chances of interaction with the poor environment which could lead to one or the other forms of morbidity ending in mortality. In this context some of the existing cultural practices of undergoing delivery in the parental home and remaining there even after delivery for a year or so may be strengthened through education to minimise infant mortality (see Table 13.3).

Table 13.2: *Mean Weight of Infants related to Fasting for three States of U.P., A.P. and Kerala*

Fasting	0-1 months	1-2 months	2-3 months	3-4 months	Total and percentage
			Uttar Pradesh		
Fasting	2.4	2.8	4.8	6.7	19.5
	(10)	(4)	(6)	(2)	(22)
Semi-fasting	3.1	4.1	4.8	5.2	47.8
	(17)	(19)	(7)	(11)	(54)
No fasting	4.2	4.7	4.6	6.0	32.7
	(15)	(9)	(8)	(5)	(37)
TOTAL					113
			Andhra Pradesh		
Fasting	4.0	-	5.0	5.5	4.0
	(2)		(1)	(2)	(5)
Semi-fasting	-	-	4.2	5.8	3.2
			(2)	(2)	(4)
No fasting	3.04	4.10	4.7	5.2	92.7
	(26)	(24)	(39)	(26)	(115)
TOTAL					124
			Kerala		
Fasting	3.0	4.0	5.5	6.5	7.7
	(2)	(4)	(1)	(1)	(8)
Semi-fasting	3.2	4.7	4.0	-	6.7
	(4)	(2)	(1)		(7)
No fasting	3.1	4.1	4.6	6.1	85.6
	(22)	(28)	(22)	(17)	(89)
TOTAL					104

Note: Figures in parentheses represent the number of cases at each age. Semi-fasting means only fasting once. More than once or complete fasting for a day or more is called fasting.

Education of Mother

The educational background of mother and father is a very important factor influencing infant mortality. In rural areas, however, the education of the former is relatively more important than that of the latter because the mother will be the principal agent of socialization of babies during most of the days. It is assumed here that better educated mothers unlike illiterate mothers may follow appropriate methods of child care practices and avoid the risk of infant mortality. The education of the mothers hence constitute one of the most important social variables which may have direct and indirect influence on several other variables, that influence infant mortality.

Table 13.3: *Percent Distribution of Respondents by Infant Death and Type of Family in U.P., A.P., Kerala and India*

	Infant deaths			
Type of family	U.P.	A.P.	Kerala	India
Joint family	31.7 (176)	20.5 (84)	6.8 (28)	20.9 (288)
Nuclear family with additional members	35.8 (110)	19.7 (69)	10.2 (57)	19.4 (236)
Nuclear family	44.5 (506)	27.0 (335)	12.9 (197)	26.6 (1038)

Table 13.4: *Percent Distribution of Respondents according to Infant Deaths by Education of Mothers in U.P., A.P., Kerala and India*

	Infant deaths			
Education of mothers	U.P.	A.P.	Kerala	India
Illiterates	41.8 (715)	27.5 (382)	27.0 (88)	34.6 (1185)
1 - 5	24.0 (46)	21.3 (70)	14.2 (108)	17.5 (224)
6 - 8	34.4 (21)	14.5 (24)	11.0 (49)	14.0 (94)
9 + classes	27.8 (10)	10.4 (12)	3.8 (37)	5.3 (59)

The proportion of infants who died in all the states has a negative association in all the states and also for the aggregate data among the respondents. However, it is more pronounced in Kerala and A.P. than U.P., because of the higher and extensive education prevailing among the women in these States. Mortality does not differ among illiterates between Kerala (27 %) and A.P. (27.5 %) states, but it is significantly more among illiterates in U.P. (41.8 %), which means other than literacy, certain cultural, ecological, nutritional and other variables may be operating particularly here. The percentage range of infant deaths among different categories of education of mothers is 3.8 - 27.0, 10.4 - 27.5, and 24.0 - 41.8 in Kerala, A.P. and U.P. respectively and the pooled range for the country is 5.3 - 34.6. In U.P., even with the advancement of education among women infant mortality has not steeply declined as in the case of A.P. and Kerala. Hence, further study focussing more on the quality of education and other allied determinants of infant mortality in U.P. is suggested here (see Table 13.4).

Education of Father

Education of the father also has a pronounced negative association with infant mortality in all the three states among the respondents. The trend is similar to that of the mothers. As in the case of the mother's education, the proportion of infants who died

Table 13.5: *Percent Distribution of Respondents according to Infant Deaths by Education of Father in U.P., A.P., Kerala and India*

Education of fathers	Infant deaths			
	U.P	A.P.	Kerala	India
Illiterate	48.2 (395)	27.8 (279)	27.3 (69)	35.8 (743)
1 - 5 class	43.1 (169)	25.0 (91)	14.9 (104)	25.0 (364)
6 - 8 class	28.2 (76)	20.4 (44)	11.2 (58)	17.8 (178)
9 - 11 class	32.4 (91)	19.0 (48)	5.0 (37)	13.8 (176)
College education	25.6 (61)	15.7 (26)	4.9 (14)	14.6 (101)

in Kerala and A.P. are similar and significantly less than that in U.P. Here again the steep decline in infant mortality with advancement of education is more in Kearla followed by A.P. and the least in U.P. While infant mortality is negligible for the fathers who had a college education in Kerala (4.9 %), it is somewhat more in A.P. (15.7 %) and significantly higher in U.P. (25.6 %). The range of percentage of infant deaths among different categories of the education of the father is 4.9 - 27.3, 15.7 - 27.8 and 25.6 - 48.2 in Kerala, A.P. and U.P. respectively, and the pooled range is 13.8 - 35.8. Why does infant mortality rate vary significantly in spite of the father having uniform college education across the three states ? It may be because of several other dimensions of social development and health other than education. These levels are lower in A.P. and the lowest in U.P. They explain the existing inter-state variations in infant mortality and their influence can be seen in other chapters under path analysis.

Economic Status

Income of the family has a pronounced negative association with infant mortality in Kerala and U.P. but an inconsistent association is seen in A.P. among the respondents. Even among the lowest income groups with an annual income of Rs. 5,000 and below, the proportion of infant mortality is the lowest in Kerala (13.1%), significantly higher in A.P. (23.5%) and still higher in U.P. (43.7%). A similar trend is noticed even among the highest income group with an annual income of Rs. 17,000 and more; it is only 4.7 percent in Kerala as against 23.9 percent in A.P. and 32.7 percent in U.P. and at the aggregate level the percent is 16.1. It is surprising to note that the proportion of infant mortality does not differ much between the lowest and highest income groups in A.P., but it varies significantly in Kerala and U.P. However, the infant mortality varies similarly even among the high income groups across these three states. The range of percent of infant deaths among mothers in different income groups is 4.7 - 13.1, 18.9 - 26.8, and 24.1 - 43.7 in Kerala, A.P., and U.P. respectively and the pooled range for the country is 14.9 - 30.7. Thus, it is more or less certain that income influences to a great extent the inter-state variations, the variations within each state and also for the country, at large (Table 13.6).

Table 13.6: *Percent Distribution of respondents according to Infant Deaths and Income in U.P., A.P., Kerala and India*

	Infant deaths			
Income	U.P.	A.P.	Kerala	India
≤ 5,000	43.7 (330)	23.5 (96)	13.1 (51)	30.7 (477)
5,000 - 9,000	39.9 (320)	26.8 (219)	13.3 (136)	25.6 (675)
9,000 - 13,000	34.5 (90)	22.9 (87)	10.6 (56)	19.9 (233)
13,001 - 17,000	24.1 (20)	18.9 (32)	9.5 (25)	14.9 (77)
17,001 +	32.7 (32)	23.9 (54)	4.7 (14)	16.1 (100)

Socio-cultural Variables: Correlation Co-efficients

The socio-cultural variables studied here to examine their influence on infant mortality are: religion, type of family, wife's education, income, fasting during pregnancy and lactation. Among these variables, wife's education and income are negatively associated with infant mortality. The mother's education is negatively correlated with infant mortality in all the three states. It is one of the most powerful variables that reduces the incidence of infant mortality. Income is negatively associated with infant mortality in U.P. and Kerala, but it is not consistent in A.P. The reason may be that people in A.P. may have better income and consequently better houses than the people in U.P. and Kerala. Type of family and fasting during pregnancy and lactation are the only two variables that are positively correlated with infant mortality.

Religion is positively correlated with infant mortality in U.P. and negatively correlated in A.P. and Kerala. It may be because a higher level of piety and greater socio-economic backwardness are found in U.P., but not in A.P. and Kerala (see Table 13.7)

Thus, cultural factors, viz., religion, caste, family type, and fasting during pregnancy have shown differntial significant influence across the three states. Similarly, socio-economic status variables, viz., education of mother and father and family income showed a

Table 13.7: *Correlation Co-efficient of Different Socio-cultural Variables with Infant Mortality among the Three States.*

Socio-cultural variables	U.P.	A.P.	Kerala
Religion	+.089	-.018	-.060
Type of family	+.119	+.066	+.079
Mother's education	-.104	-.113	-.208
Income	-.084	-.035	-.092
Fasting during pregnancy and lactation	+.036	+.023	+.055

very pronounced negative association in all the states except for the inconsistency with regard to family income noticed exclusively in A.P. Hence it can be concluded that changes in certain cultural aspects and improvement in socio-economic status will go a long way in reducing infant mortality in all areas. Added to these factors, improvement in the ecological conditions of the households is equally important in reducing infant mortality.

14

Ecological Profile

– K. Mahadevan & (Ms) A. Swarnalatha

A few more ecological variables, viz., type of house, number of rooms owned, house sanitation index computed on the basis of refuse disposal, water stagnation, fly nuisance, etc., have been considered here. However, sources of drinking water supply have not been analysed because of the difficulty involved in classifying the levels of protection of water received from several sources. It is assumed that all these ecological factors might have different levels of influence on infant mortality across these states depending upon their prevalence. Since Kerala is well-known for better ecological features compared to the other two states, it is hypothesised that these factors would have the least adverse effect on infant mortality in this state as against A.P. and U.P.

Type of House

In all the three states, negatve association of infant mortality with type of house is conspicuously seen. However, more people in all the three states live in kutcha houses (poor) than in the semi-pucca and pucca (better) houses. It is a fascinating finding. The characteristics of these three types of houses reveal that a kutcha house has a very poor and unhygienic roof, walls, floor and environment around it, but the case is somewhat better for the semi-pucca houses and fairly good in pucca houses. These differential environmental hazards of the kutcha, semi-pucca and pucca houses differentially explain the infant mortality within and across the three states. Farah and Preston (1982) have also reported a definite influence of type of house on infant mortality in the Sudan (see Table 14).

Table 14 : *Percent Distribution of Respondents according to the Infant Deaths and Type of houses in U.P., A.P., Kerala and India*

Type of houses	Infant deaths			
	U.P.	A.P.	Kerala	India
Kutcha	44.8 (47)	26.3 (128)	15.1 (123)	21.2 (298)
Semi-pucca	42.5 (545)	24.6 (326)	10.5 (144)	25.5 (1015)
Pucca	32.6 (200)	17.7 (34)	4.9 (15)	22.4 (249)

χ^2 for 4 d.f. = 295.9, P = 0.01

Table 14.1: *Percent Distribution of Respondents, according to Experience in Infant Deaths and Number of Rooms in U.P., A.P., Kerala and India.*

Number of rooms	Infant deaths			
	U.P.	A.P.	Kerala	India
1 room	40.8 (278)	29.6 (207)	14.5 (12)	34.0 (497)
2 rooms	43.1 (280)	23.8 (174)	12.2 (50)	28.1 (504)
3 rooms	34.6 (97)	19.6 (74)	15.5 (103)	20.8 (274)
4 rooms	35.4 (58)	19.8 (24)	11.0 (62)	17.0 (144)
5 + rooms	35.0 (79)	12.7 (9)	7.0 (55)	13.3 (143)

Number of Rooms

While most of the respondents in Kerala (80.2 %) live in fairly adequate space with the three and more rooms, significantly less people in U.P. (33.5 %) and A.P. (28.4 %) live with similar convenience. On the contrary, an overwhelming percent of respondents in A.P. (71.6 %) and U.P. (66.5 %) as against only one-fifth of their counterparts in Kerala (19.8 %) live in limited space with only one to two rooms. These differences noticed in living space between Kerala on the one side and A.P. and U.P. on the other also explain the existing inter-state variations in infant mortality. When the physical structure of the house alone is considered, better houses are seen more frequently in U.P. than in Kerala among the low income group. No doubt in rural areas in Kerala now-a-days massive modern houses have been built extensively by the migrant population. Further, the number of rooms owned by the people show a negative association with the experience of infant mortality; it is more pronounced in Kerala and A.P. and less in U.P. This factor is a composite one and reflects socio-economic status besides the environmental facility. Since the number of rooms may contribute to differential ecological influence this factor is very relevant here. In fact, positive ecological changes have happened extensively in Kerala but not in the other two states. Kerala's steep decline in infant mortality is also due to the improvement in housing facilities created on a massive scale for the poor people. Therefore, certain of better housing facility for the poor may improve the health conditions and reduce mortality, particularly among the hut dwellers.

House Sanitation

The house sanitation index is classified into poor, moderate and good, based on the equal distribution of scores. There is a negative relationship between infant mortality and the sanitation around the houses. The range of differences in mortality experienced in the families across these states is 33.5 - 41.7; 22.5 - 26.5 and 4.9 - 14.5 in U.P., A.P., and Kerala respectively. It is more pronounced in Kerala as against the other two states. The findings only confirm the well-known excellent sanitation existing in the houses of Kerala in contrast to the poor situation prevailing in the other places. A similar trend is noticed at the aggregate level also. These findings, thus, partly explain the interstate variations in infant mortality. However, they do not fully explain the same within A.P. though it is positive in Kerala and to a certain extent in U.P. (see Table 14.2).

Table 14.2 : *Percentage Distribution of Respondents according to Infant Deaths and Index on the Ecological Profile in U.P., A.P., Kerala and India*

An index on the ecological profile	Infant deaths			
	U.P.	A.P.	Kerala	India
Poor	41.5 (161)	86.5 (181)	14.5 (62)	27.0 (404)
Moderate	41.7 (465)	23.6 (241)	12.6 (194)	24.5 (900)
Good	33.5 (166)	22.5 (66)	4.9 (26)	19.5 (258)

Table 14.3: *Correlation Co-efficient of Ecological Variables Influencing Infant Mortality in the Three States*

Ecological variables	U.P.	A.P.	Kerala
Type of house	-.101	-.039 (t = 1.74)	-.106
Number of rooms	-.065	-.106	-.094
Index of ecological profile	-0.58	-.048	-.105

Correlation Co-efficients of Ecological Variables

The following ecological variables, viz., type of house, number of rooms and house sanitation index are negatively associated and statistically significant with infant mortality in all the three states except type of house in A.P. An index developed using several ecological factors, viz., water stagnation, refuse disposal, fly nuisance and ventilation was found to be highly valuable. In view of the poor ecological conditions generally prevailing in these states, except Kerala, priority may be given to improve these conditions in order to minimise their adverse effect on infant health and mortality.

15

Health Delivery System

– K. Mahadevan & (Ms) K. Suvarnalatha

Effectiveness of the health delivery system is a major determinant of the health status of mothers and children. It is a complex variable by itself which is influenced by a variety of factors. Since the present study is not exclusively on the health delivery system, there are constraints in dealing with all the relevant points. The utilization of health facilities depends upon a number of factors like the client's background, location of the health delivery institution, distance and transport facilities, behaviour of the service personnel, and the facilities for procuring medicines. In the present study, however, only a few factors such as certain aspects of the client's behaviour, type of medicines received, service personnel and type of services rendered are considered for discussion because of the obvious constraints in collecting all the needed data in this one short survey. Since the health delivery system forms a major determinant of infant mortality only selected and salient aspects are discussed here on account of paucity of time and space.

Health Care

The health care service is available in India largely through Primary Health Centres more or less uniformly in all the states, except in Kerala. In Kerala a widespread health care system exists with the PHCs, and hospitals of three main systems of medicines viz., allopathy, homeopathy and ayurveda. Private and government institutions work in a spirit of healthy competition to serve the people at large. Such a widespread facility is not there in U.P. and A.P. The data also reflect the significant differential utilization of health care services in these states. While 94 percent of the mothers in Kerala received one or the other type of medical care for their pregnancy, only 52 percent in A.P. and 46 percent in U.P. received such care. Also, while 54.0 percent and 48.4 percent of infants who died did not receive any medical service in U.P. and A.P. respectively, in Kerala only very negligible cases (5.0%) did not receive such help. Such significant differences in medical service for the pregnant mothers would have naturally contributed to differential infant mortality. If widespread medical facilities were not available in Kerala, then infant mortality in Kerala would have been similar to that of the other states. The large-scale health service facility available in Kerala may be responsible for her low infant mortality, whereas the poor health service facility-cum-poor utilization of what is available in the other two states may be a factor for the higher incidence of infant mortality there.

Table 15: *Percent Distribution of Infant Deaths by Antenatal Services received from the PHCs and Hospitals in U.P., A.P., Kerala and India*

Services on health care	U.P.	A.P.	Kerala	India
Services not received (antenatal care)	54.0 (675)	48.4 (325)	5.6 (20)	44.8 (1020)
Services received (antenatal care)	45.9 (573)	51.5 (346)	94.4 (336)	55.2 (1255)

Note: Total does not tally because the unresponsive cases have been omitted.

Table 15.1: *Percent Distribution of Type of Medical Care used for Infants in U.P., A.P., Kerala and India (Pooled)*

Type of Medical care	U.P.	A.P.	Kerala	India
Self-medication	41.6	25.9	19.7	33.4 (765)
Unqualified persons	19.1	8.2	2.5	13.2 (303)
Unani/Homeo/Ayurvedic	0.9	1.8	6.5	2.1 (47)
Allopathy	38.4	64.1	71.3	51.3 (1172)

Type of Medical Care

The type of medication (allopathy, indigenous system of medicine and self-medication) arranged by parents for their sick infants, was ascertained by asking the respondents: "When your child fell ill, from whom did you take treatment at the first instance?". The types of treatment received have been classified into: self-medication, medication by unqualified persons, indigeneous physicians and allopathic doctors. It is significant that 61 percent of the babies who died in U.P., 34 percent in A.P. and 22 percent in Kerala states did not get proper medical care from qualified/trained personnels. Hence it may be true that a large-scale lapse in rendering proper medical care to the morbid babies found in U.P. and to a certain extent in A.P. might be a major determinants of the existing differential mortality among these states. In Kerala, in spite of receiving medical help from a very large number of allopathic doctors, a very high percentage of mortality is found among such clients (71.3%), which is a major researchable question for this state. It may be due to irregular/improper diagnosis, utilization of medicine and care. There may also be other causes which could not be controlled by such treatment. It should be mentioned here that very often the infants are taken to the doctors only in a critical condition and the doctors may not be able to save such babies. It is interesting to note that a negligible percentage of unqualified persons operate in Kerala. The percentage is 3 times higher in A.P. (8.2%) and eight times higher in U.P. (19%). Interestingly, in Kerala 6.5 percent of babies received medical help from the other systems of medicine, viz., homeopathic, ayurvedic and Unani system of medicines.

Service Personnel

Personnel attending on the pregnant mothers during pregnancy and post-delivery period are an important factor that influences the outcome of the delivery and survival chances of the children. This hypothesis has been confirmed in the analysis of data from these states. An overwhelming percent of mothers who lost their infants in U.P. (94%), A.P. (76%), and much less in Kerala (35%) depended on untrained dais or relatives for delivery care. This would have been a major factor responsible for the death of these infants.

On the other hand, death of babies resulting from the involuntary negligence of unqualified persons in Kerala is very low. The limited number of deaths here might be largely due to delivery complications, because 63 percent of the deliveries of infants who died, were attended to by trained and qualified persons as against only 24 percent in A.P. and six percent in U.P. Hence we can confirm the hypothesis that most of the deaths that happened in U.P. and A.P. must have either partially or wholly due to the unscientific pregnancy and delivery care received from unqualified persons. Similar findings on Kerala have already been reported in another recent study by this author (Mahadevan and Sumangala, 1987). Hence, there is an urgent need to strengthen the scientific health care system extensively in U.P. and A.P. states to reduce large-scale infant mortality. By doing so the chances of acceptance of contraception and limitation of family size in such states in India (see Table 15.2) may also increase.

Table 15.2: *Percent Distribution of Infant Deaths by Delivery Attendant of Deceased Child in U.P., A.P., Kerala and India (Pooled)*

Delivery Attendants	U.P.	A.P.	Kerala	India
Relatives	1.5	2.7	8.5	3.0 (68)
Untrained Dais	92.5	73.1	26.5	76.2 (1743)
Trained Dais	2.6	7.7	13.7	5.9 (134)
ANMs/Doctors in Houses	1.0	5.4	9.3	3.6 (83)
ANMs/Doctors in Hospitals	2.4	11.1	42.0	11.3 (259)

Periodic Check-up

A periodical check-up received during pregnancy is a factor that affects the differential mortality conditions in these states. It is presumed that in the past, more care during pregnancy was available for women in Kerala than in A.P. and U.P. Consequently, significant cases of infant deaths in U.P. and A.P would have happened without proper and periodic medical care during the pregnancy. This is confirmed by the Table 15.3. While 97.3 percent of the infants, who died in U.P. and 79.5 percent in A.P as against only 63 percent of infants died in Kerala, without getting any medical care during their mother's pregnancy period. It was an alarming situation that prevailed at least during the last twenty years of the reproductive period of these women. The present situation in U.P. and A.P. has not improved very much either, though the situation in Kerala has changed radically during the last two decades. Hence the differential facility available for periodic health check-ups during pregnancy in these three states might be a major determinant of differential infant mortality rates.

Table 15.3: *Percent Distribution of Infant Deaths by Months of Treatment received during Pregnancy, in U.P., A.P., Kerala and India*

Months of treatment during pregnancy	U.P.	A.P.	Kerala	India
No treatment	97.3	79.5	62.6	86.5 (1978)
Only 3rd trimester	1.0	6.7	4.1	3.2 (72)
2nd and 3rd trimester	1.4	7.3	21.3	6.3 (145)
Throughout pregnancy	0.3	6.5	12.0	4.0 (92)

Cutting Umbilical Cord

It has been reported in most of the earlier studies that the instruments used for cutting the umbilical cord are yet another killer of the babies (Mahadevan, *et al.*, 1985; Simmons, *et al.*, 1979). Very often improper instruments like a common kitchen knife, sickel, old blade and such instruments are used because they are readily available in homes and the birth attendants are not aware of the dangerous consequences of using them. To aviod the risks to the mother and baby, it is necessary to supply scientific instruments freely to all birth attendants and pregnant mothers and educate them to use these instruments only at the time of delivery.

The data given in Table 15.4 fully confirms the deleterious influence of using unscientific instruments mostly in U.P. (84%) and A.P. (58%) but not in Kerala. While in a significantly large percentage of delivery cases people in U.P. (94%) and A.P.(79.3%) have used the wrong instruments, only a small percentage of people in Kerala (18.3 %) used similar tools. Therefore, the cutting instrument *per se* is found to be a major killer of infants in U.P. and A.P. The use of sterilized material without proper hygienic practices may also nullify the benefit of sterilization. Since that factor is not studied here we have to presume that poor sanitation and hygiene widely seen in U.P. and A.P. states may still cause the high incidence of tetanus prevailing in these states as a major killer of babies (see Table 15.4).

Table 15.4: *Percent Distribution of Respondents by Instruments used to cut Umbilical Cord in U.P., A.P., Kerala and India (Pooled)*

Materials used	U.P.	A.P.	Kerala	India
Hasava/Kitchen knife	10.0 (200)	21.8 (436)	7.1 (177)	12.5 (813)
New/old blade/ unsterilized scissors	84.0 (1680)	57.5 (1150)	11.2 (280)	47.8 (3110)
Sterilized scissors	6.0 (120)	20.5 (409)	80.6 (2016)	39.2 (2545)
No response	- (5)	0.2 (27)	1.1 (32)	0.5

Table 15.5: *Percent Distribution of Infant Deaths by Throat cleaned in U.P., A.P., Kerala and India*

How was the throat cleaned?	U.P.	A.P.	Kerala	India
Don't know	1.4	-	8.2	2.1 (47)
Unwashed hands	5.1	-	-	2.8 (64)
Washed hands	91.4	92.7	37.7	83.2 (1900)
With gloves	2.1	7.3	54.1	11.9 (273)

Confinement

To the question "how long have you been confined separately in a room after delivery", significant variations have been noticed in the reply given by the people of the three states. While most of the women in Kerala had a very long confinement of three to five or more weeks, the majority of cases in U.P. and A.P. had only two or less weeks. It is a factor that can differentially affect the health of the mother and baby alike. While this custom has yielded very favourable results in Kerala, it has done moderate good in A.P. and has proved deleterious in U.P. considering the chances of risk in health involved by exposing the baby to poor environment conditions around the house. Since the baby and mother are invariably weak during this period and vulnerable to infection from the environment, a longer duration of isolation for mother and baby may reduce the risk of infection from others. Hence the cultural practice prevailing in Kerala of keeping the mother and baby for a longer period isolation is favourable (table not given).

Cleaning Throat

After the delivery the mouths of infants are generally cleaned before allowing them to breastfeed. The mouth of the baby is an important contact point for infection. Wrong and unhealthy practices may cause throat infection to the new-born leading to possible morbidity and mortality. The data reveal that while 91 to 93 percent of the cases in U.P. and A.P. respectively clean the mouth of the baby preferably with hands washed in ordinary water, in Kerala only 38 percent of such cases are reported. On the other hand, in 54 percent of cases in Kerala, sterilized gloves were used to clean the mouth of the baby. Invariably human hands in rural areas are not free from pollution and the water used to clean the hands is also not absolutely safe. Therefore, cleaning the mouth of the baby with hands may be dangerous as seen in U.P. and A.P. This practice may be one of the factors that causes the differential morbidity and mortality of infants among the two states on the one hand and the Kerala state on the other. To avoid such a risk, health education is urgently needed for pregnant mothers, relatives and birth attendants alike on such matters.

Correlation Co-efficients of Health Services Variables

The health care variables considered here for their influence on infant mortality are : treatment during pregnancy, delivery attendants and materials used to cut the umbilical cord. They are negatively and significantly correlated with infant mortality in all the three states. However, the treatment during pregnancy and delivery attendants show much higher value of correlation with infant mortality in all the three states than the materials used to cut the umbilical cord. Of course, all the three are important to prevent risking the health of the mother and the baby. Infant, if these three variables are manipulated by appropriate interventions, more than 50 percent of the existing infant mortality can be reduced.

Table 15.6: *Correlation Co-efficient of Health Variables Influencing Infant Mortality in the Three States.*

	U.P.	A.P.	Kerala
Treatment during pregnancy	-.568	-.488	-.476
Delivery attendant	-.603	-.555	-.661
Material used to cut the umbilical cord	-.101	-.102	-.095

16

Breastfeeding and Weaning

– K. Mahadevan & (Ms) P. R. Reddy

Among the several factors that affect infant mortality, breastfeeding is one of the major variables. It has several components beginning with the prelacteal feeds, followed by duration of breastfeeding, frequency of breastfeeding, breastfeeding and weaning practices, nutritional status of the mother and fasting during the lactation period. All these factors cumulatively may affect the immediate and long-term health of the babies.

Initiation of Breastfeeding

The initiation of breastfeeding begins quite early in the majority of the respondents in Kerala. Initiation begins in 95.8 percent of the cases during the first three days for babies while in 47 percent of the cases it is on the first day. In A.P., 94.6 percent of women start breastfeeding during the first three days and 18.4 percent on the first day. The U.P. state is at the lowest rung of the ladder with 51.9 percent commencing breastfeeding during the first three days and only 2.7 percent initiating on the first day. Many of the cases in U.P. initiate breastfeeding on fourth and fifth days while it is not so in A.P. and Kerala. This practice of no initiation of feeding among many cases during the first three days can have a detrimental effect on the health of new-born baby and may have a bearing on infant mortality for U.P. The findings indicate the need to educate the mothers, the delivery attendant and elder relatives of the families to increase an awareness of the advantages of early initiation of breastfeeding.

During the first three days for the newborn a variety of foods are given in all the three states. While caster oil is given in A.P., this is not the practice in U.P. and Kerala. In U.P., 93.2 percent provide animal milk, while it is not so predominant in A.P. (8.2%) and Kerala (0.3%). In A.P., wetnurse's milk is given while this is not a common practice in U.P. (1.3%) and Kerala (0.3%). Dry grape juice is a predominant food item given in Kerala (37.2), whereas in the other two states this practice does not exist. Various other foods like sugar candy and tender coconut water are given in a small number of cases in the three states. Sugar, glucose water and honey are also given in A.P. (27.5%), in Kerala (29.3%) and in U.P. (4.2%). Introduction of unboiled water occurs at the earliest in majority of the cases (54.8%) at two months. In A.P. it occurs at 5-6 months (73.1%) and in Kerala it happens at 11-12 months (33%). A unique feature in this context noticed in Kerala is that in rural areas most babies and adult members invariably take only boiled water (water boiled with cuminseed) as a general custom which is very valuable for preventing diarrhoea among infants, children and also among adults. Giving boiled and cooled water to babies has become a general practice in China, which may be a major determinant of low level of child mortality in that country.

Table 16: *Percent Distribution of Respondents in U.P., A.P., and Kerala by Initiation of Breastfeeding – Last Child*

Breastfeeding : Last child	U.P.	A.P.	Kerala
Not applicable	1.2	2.2	0.6
Sixth day	1.0	0.8	0.4
Fifth day	18.8	1.4	0.3
Fourth day	18.3	1.1	2.8
Third day	39.1	69.0	26.2
Second day	10.1	7.2	22.5
First day	2.7	18.4	47.2

Initiation of Breastfeeding and Infant Mortality

It is well recognised that the colostrum which is secreted by the mother during the first few days after delivery, is rich in many nutrients and anti-infective factors, which protect the infants from infection. The early feeding of the baby also helps the mother-child both and the duration of lactation (Cameron and Hofvander, 1983). In the present study it is observed that there is a marked increase in the proportion of infant deaths between the first and the third day of initiation of breastfeeding for all the three states. The total for the three states shows 12.8 on the first day of initiation and 48.1 on the third day of initiation. This trend may also be related to other factors influencing infant mortality (Table 16.1).

Table 6.1: *Percent Distribution of Infant Deaths by Initiation of Breastfeeding (last child) in U.P., A.P., Kerala and India*

Initiation of breastfeeding	U.P.	A.P.	Kerala	India
N. A.	2.4	2.7	-	2.1 (48)
6th day	0.7	0.9	0.3	0.7 (16)
5th day	18.5	0.9	0.3	10.4 (238)
4th day	17.0	0.7	1.9	9.8 (224)
3rd day	39.7	69.1	38.2	48.1 (1100)
2nd day	19.3	6.7	22.7	16.1 (369)
1st day	2.4	19.0	36.6	12.8 (292)
Total	(1249)	(672)	(366)	(2287)

Weaning and Infant Mortality

In the three states covered in the present study weaning begins at six to seven months among the majority of the mothers reporting. This is a dangerous period in that the method of introduction of semi-solid food is generally not provided according to hygienic principles among the low income groups. So infection can be rampant during this period and to some extent in the later stages also. It is well known that there is a higher rate of infection, particularly of diarrhoeal diseases, in this period compared to any other period in life. It is interesting to note that the highest infant mortality occurs at six to seven months of weaning in total of all the three states irrespective of sex. Considering the total for the three states, the proportion of infant deaths is 12.1 at 1-5 months and 45.7 at 6-7 months among male children and the corresponding values for female children are 9.2 and 44.0 respectively. After the seventh month there is a decline in the proportion of infant deaths. In Kerala the introduction of weaning foods begins as early as three months. Accordingly, the proportion of infants who died is the highest in the 1-5 months period in male as well as female children. In A.P. and U.P. however, weaning really begins at 6-7 months and the proportioin of infant deaths is also high at this period. (Table 16.2).

Table 16.2: *Percent Distribution of Infant Deaths by Sex and the Introduction of Solid Food in U.P., A.P., Kerala and India*

Beginning of solid food	U.P.		A.P.		Kerala		India	
	Male	Female	Male	Female	Male	Female	Male	Female
1. Not applicable	2.5	6.0	3.4	-	0.6	-	2.5	3.3
	(16)	(32)	(12)		(1)		(29)	(32)
2. 10-12 months	33.6	37.6	16.1	12.5	12.5	16.3	25.2	26.8
	(220)	(202)	(56)	(36)	(23)	(26)	(229)	(264)
3. 8-9 months	20.5	23.1	8.0	10.5	5.5	6.9	14.5	16.8
	(134)	(124)	(28)	(30)	(10)	(11)	(172)	(165)
4. 6-7 months	42.7	32.9	62.5	70.7	24.7	33.1	45.7	44.0
	(279)	(177)	(218)	(203)	(45)	(53)	(542)	(433)
5. 1-5 months	0.8	0.6	10.0	6.3	56.6	43.8	12.1	9.2
	(5)	(3)	(35)	(18)	(103)	(70)	(143)	(91)
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	(654)	(538)	(349)	(287)	(132)	(160)	(1185)	(985)

$\chi^2 \doteq 9.2, > P = 0.05$ for 3 d.f; $X^2 = 5.7, < P = 0.01$ for 3 d.f.
$\chi^2 = 5.8, < P = 0.01$ for 3 d.f. for U.P., A.P. and Kerala respectively.

Types of Weaning Foods Given

Mothers having children in the age groups 4-8 months, 9-12 months, 1-2 years and 2 and more years were asked to indicate the different weaning foods given to their children.

The percent distribution of respondents, as per the types and combination of foods used during the weaning period which begin at 4 months and go up to 24+ years, showed that the number of foods given increased as age increased in all the three states. In U.P., the emphasis is on vegetarian foods such as cereals, pulses, fruits, vegetables, milk and milk products for children who are 1-2 and 2+ years. The percent distribution of respondents giving the above foods to 1-2 years old children is 66.9, 22.0 and 11.2 for U.P., A.P. and Kerala respectively. For children above 2 years, the percent distribution is 80.0, 10.2 and 9.8 for U.P., A.P., and Kerala respectively. In Kerala and A.P., a greater number of mothers give non-vegetarian foods like eggs, meat and fish in addition to the above vegetarian foods for children of 1-2 and 2+ years of age. The percent distribution of respondents giving such foods to 1-2 years old children is 3.3, 33.6 and 66.1 for U.P.. A.P. and Kerala respectively. For children above 2 years the corresponding values are 2.9, 35.6 and 61.5 respectively. The non-vegetarian foods that are consumed as weaning foods by the children of 1-2 years and 2+ years age group are highest in Kerala followed by A.P., and U.P. It is very low in U.P. state. This may be due to religious practices, and also the non-availability of non-vegetarian foods in the interior regions. Kerala and A.P. have long stretch of coastal areas as well as inland fishing facilities. In A.P., cereals and pulses are introduced as weaning foods as early as four months and a greater percentage of mothers give these foods to children at all age levels compared to the mothers in U.P. and Kerala. At 4.8 months the percent of mothers introduced cereals and pulses is 10.9, 66.4 and 25.7 for U.P., A.P. and Kerala respectively. At 9-12 months the corresponding figures are 21.6, 75.8 and 0.3 while at 1-2 years the values are 16.7, 81.2 and 2.1 respectively. This pattern persists for children above two years. Marketed foods such as Farex and Cerelac are used minimally for children up to 12 months. Beyond this age only a few mothers in the three states feed the children with these items. At 4-8 months the percentage of mothers using marketed foods is 0.6, 62.5 and 37.5 for U.P., A.P. and Kerala respectively, while the corresponding values are 12.0, 68.0 and 20.0 for the 9-12 months age groups. Marketed foods are not popular in the rural areas due to economic factors and inaccessibility. The consumption of fruit and vegetables is very limited for all age levels of children in all the three states. Cereals, pulses, milk and milk products and non-vegetarian items are generally preferred as weaning foods to fruit and vegetables. Using fruit and vegetables among families is generally low in all the three states and this is reflected in the weaning foods given to infants. The NNMB (1980) survey among these three states has also shown a low consumption of vegetables and fruit among the rural families of low income groups. Mothers should be encouraged and educated to give fruits and vegetables at least from sixth months onwards. The education given should focus on the importance of these items for the children's health. The duration of weaning from four months to two years and more is to be promoted since this practice will provide the young children with valuable breast milk protien as well as other necessary supplementary nutrients.

Table 16.3: *Percent Distribution of Respondents in U.P., A.P. and Kerala as Per Fruit and Vegetables given at Different Ages of Children*

States	Age			
	4-8 months	9-12 months	1-2 years	2+ years
U.P.	30.1	23.2	20.0	-
	(20)	(13)	(1)	
A.P.	41.1	50.5	60.0	-
	(30)	(28)	(3)	
Kerala	28.8	25.3	20.0	-
	(21)	(14)	(1)	

Note: National Nutrition Monitoring Bureau. Section-II Food and Nutrient Consumption Pattern in Selected Districts of Different States. National Institute of Nutrition, ICMR, Hyderabad, 1981, pp. 7, 37 and 69.

Hygienic Practices of the Milk Bottle and Teat

The respondents were questioned about their practice of cleaning the milk bottle and teat as this aspect plays a very important role in maintaining the health of the child. The information thus collected indicated that 98.5 percent of the mothers in Kerala use a sterilised feeding bottle and teat. None of the U.P. mothers follow this practice while 24 percent of the A.P. mothers use sterilised bottles. The majority of the mothers in U.P., use either cold or hot water, neither of which prevents infection of the digestive tract. In A.P., 76 percent of the cases use cold or hot water while in Kerala it is only 1.5 percent. Early initiation of breastfeeding and hygienic practice related to weaning and bottle feeding are important factors in preventing infections. The present study indicates that U.P. occupies the lowest status with regard to the above practices and Kerala stands at the other end of the spectrum.

Table 16.4: *Percent Distribution of Respondents in U.P., A.P., Kerala by Hygienic Practices related to Milk Bottle and Teat*

Hygiene of the bottle and teat	U.P.	A.P.	Kerala
Not applicable	1994	1992	2334
Cleaning with cold water	16.7	73.2	1.5
Cleaning with hot water	83.3	2.8	-
Sterilised	-	24.0	98.5

Breastfeeding and Child Mortality

Information related to mean child deaths according to duration of breastfeeding has been presented in Table 16.5 for the three states, block-wise. The pattern that emerges is interesting. The range for mean child deaths is 1.4-1.7, 1.3-1.5, and 1.1.-1.4 for U.P., A.P. and Kerala respectively. This trend can be related to the better health care services and weaning practices existing in Kerala compared to A.P. and U.P. Among the Community Development Blocks in the three different states there is not much significance in the difference between the mean child deaths.

Considering the duration of breastfeeding and its relevance to infant deaths, it is observed that up to twelve months infant mortality is again low in Kerala as compared to U.P. and A.P. The highest infant mortality is in U.P. Prolonged breastfeeding up to 25+ months does not necessarily avert child mortality due to weaning practices, which can be unfavourable and lead to infection and malnutritional status (Table 16.5).

Breastfeeding : Correlation Co-efficients

The few related variables of breastfeeding, viz., duration of breastfeeding and weaning practices have been subjected to the analysis of correlation co-efficients. Both of them were found to be differentially important in one or the other states in explaining the health status and incidence of infant mortality. While duration of breastfeeding showed a uniform positive association with infant mortality in all the three states, the weaning practice manifested a similar nagative association. Breastfeeding is highly significant in

Table 16.5: *Mean Children died according to Breastfeeding and Blocks in U.P., A.P., Kerala and India*

	Breastfeeding			
C.D. Blocks	12 months	13-24 months	25+ months	Total
U.P. :				
Babina	1.6	1.6	1.5	1.6
	(36)	(92)	(20)	(148)
Bongara	1.7	1.6	1.5	1.6
	(26)	(88)	(51)	(165)
Khorabar	1.7	1.7	1.5	1.6
	(61)	(96)	(73)	(230)
Shahjanwa	1.4	1.8	1.3	1.4
	(12)	(52)	(62)	(126)
A.P. :				
Nandikotkur	1.4	1.4	1.2	1.3
	(28)	(50)	(32)	(110)
Kodumur	1.4	1.4	1.3	1.4
	(28)	(57)	(30)	(114)
Pilluta	1.4	1.6	1.3	1.5
	(25)	(69)	(38)	(132)
Modukur	1.3	1.5	1.0	1.4
	(36)	(23)	(3)	(62)
Kerala :				
Nemmara	1.4	1.3	1.8	1.4
	(9)	(40)	(18)	(67)
Alathur	1.0	1.3	1.6	1.3
	(10)	(24)	(14)	(48)
Chengannur	1.0	1.4	1.4	1.4
	(3)	(14)	(8)	(25)
Athiyannoor	1.4	1.1	1.0	1.1
	(5)	(12)	(5)	(22)
Vellanadu	1.6	1.2	1.2	1.3
	(10)	(23)	(12)	(45)
Chirayinkil	1.4	1.2	1.2	1.2
	(8)	(25)	(12)	(45)

Kerala since the weaning practice begins from the 4th month onwards and, therefore, the influence of breastfeeding noticed may not reveal its full effect on mortality and may overlap with weaning practice. The independent influence of breastfeeding can be isolated more precisely when a longitudinal study is carried out on this theme alone. Regarding the weaning practice, a statistically significant influence is noticed in Kerala and U.P. but not in A.P. (Table 16.6).

Table 16.6: *Correlation Co-efficients of Breastfeeding and Weaning Practices in U.P., A.P. and Kerala*

Breastfeeding and weaning	U.P.	A.P.	Kerala
Duration of breastfeeding	+ .049	+ .050	+ .111
Weaning practices	- .061	- .012	- .048

17

Nutritional Status

- K. Mahadevan & (Ms) P. R. Reddy

Nutritional status of respondents and their children has been assessed in the three states. A qualitative assessment of nutritional status has been made by classifying persons into lacto-vegetarian or non-vegetarian, priority of foods distributed among family members and food practices and fasting during pregnancy and lactation. Pre-schoolers nutritional status has been studied by quantitative measures of weight and height for age and sex. The weight and height of mothers were also recorded. The nutritional status of mothers is not assessed by quantitative biochemical measures in this study due to practical difficulties, viz., estimation of haemoglobin of the respondents is difficult in the field conditions. The discussion which follows highlights the nutritional status of families in general, of mothers during pregnancy and lactation and nutritional status of infants and pre-school children. Let us examine how this data can explain its differential importance. The purpose of this presentation is to provide a background for fertility and mortality study.

Diet Pattern among Families

The families are classified as lacto-vegetarian and non-vegetarian depending upon the foods used in their diets. Lacto-vegetarianism is the highest in U.P. (23.7%), the lowest in Kerala (2.5%) and A.P. (10.0%) falls in between. On the other hand, non-vegetarianism is practised to the extent of 97.5 percent in Kerala, followed by A.P. (90%) and U.P. (76.3%). This trend may be attributed to the availability of various types of food in the region, religious beliefs of the families and religious composition of the people within each state.

Table 17: *Percent Distribution of Respondents in U.P., A.P., and Kerala by Lacto-vegetarian / Non-vegetarian*

Lacto-vegetarian / Non-vegetarian	U.P.	A.P.	Kerala
Lacto-vegetarian	23.7	10.0	2.5
Non-vegetarian	76.3	90.0	97.5

Intrafamilial Distribution of Food

Considering the 'no priority' group, in Kerala and A.P. 50.5 percent and 52.5 percent of families respectively have no priority in food distribution. However, in U.P., only 4.9 percent of families have no priority. Thus, there is significant difference in the no priority group between U.P. and the other states. Looking at the intrafamilial food distribution pattern, the men get the highest priority in U.P. (75.0%) while the women get the lowest (3.8%). In A.P. and Kerala 22.0 and 43.3 percent of families respectively give priority to men. The priority given to men is the highest in U.P. followed by Kerala and A.P. For women the priority is at 0.7 and 1.8 percent for Kerala and A.P. respectively. Among the members of the family the respondents get the least priority in all the three states. Preference for sons as against daughters is indicated by 21.6

Table 17.1: *Percent Distribution of Respondents in U.P., A.P., and Kerala by First Priority in Intrafamilial Distribution of Food*

1st priority	U.P.	A.P.	Kerala
Husbands	26.3	17.9	33.7
Sons	21.6	1.3	0.4
Daughters	3.7	0.8	0.6
Small children	15.5	23.0	4.9
Respondents	0.1	1.0	0.1
Husband + Sons	27.1	2.8	9.2
Husband + Children	0.5	0.5	0.4
Others (Father-in-law, mother-in-law), etc.	0.3	0.2	0.2
No priority	4.9	52.5	50.5

and 3.7 percent respectively in U.P. This marked trend is not there in A.P. and Kerala. This may be due to socio-cultural differences in the states. This trend indicates the greater dominance of men in the families of U.P. than those in Kerala and A.P.

Food Practices in Pregnancy and Lactation

The respondents were classified into different groups based on the number of meals taken in a day and the choice of foods in each meal. When foods from all the three functional groups, viz., energy giving, body building and protective were chosen for each of the three meals in a day, the choice was termed as 'balanced'. This pattern was obtained at the time of survey and has no bearing on the longitudinal issue. As per the above classification, it is observed that in U.P., the highest percent (4.2) of cases occur in the most deprived groups, i.e., 'less than 3 meals and imbalanced' when compared to A.P. (2.5%) and Kerala (0.2%).

Considering the more adequate groups, i.e., three meals and balanced plus more than three and balanced, Kerala stands first at 94.2 percent followed by A.P. (59.5%) and U.P. (39.9%). Thus, there is a significant difference in meal pattern and choice of foods among the women of the three states during the period of pregnancy and lactation. This may be due to income differences as well as food beliefs and other socio-cultural conditions prevailing in these three states.

Table 17.2: *Percent Distribution of Respondents in U.P., A.P. and Kerala by Food Practices in Pregnancy and Lactation*

Food practices in pregnancy and lactation	U.P.	A.P.	Kerala
1. Less than 3 meals and imbalanced	4.2 (84)	2.5* (49)	0.2 (6)
2. 3 meals and more and imbalanced	51.6 (1031)	30.7 (614)	4.3 (108)
3. Less than 3 meals and balanced	4.4 (88)	7.4 (148)	1.3 (32)
4. 3 meals and more and balanced	39.9 (797)	59.5** (1189)	94.2 (2354)

*** $z = 11.3$, $p = 0.01$ for U.P. and A.P.**
**** $z = 12.7$, $p = 0.01$ for U.P. and A.P.**

Considering the percent of respondents consuming special foods during pregnancy, it is observed that there is no significant difference among the three states. The percentages are 32.7, 32.6 and 34.9 for U.P., A.P., and Kerala respectively. The majority of the respondents, however, do not take any care during pregnancy and lactation with regard to foods. Certain foods are promoted while other nourishing foods are avoided during pregnancy and lactation. The foods promoted and avoided during pregnancy and lactation in the three states are listed below.

Foods Specially Emphasised During Pregnancy

Promoted			Avoided		
U.P.	A.P.	Kerala	U.P.	A.P.	Kerala
Fruit	Fruit	Fruit	Papaya	Papaya	Papaya
Milk	Milk	Milk	Jaggery	Brinjal	Certain fish
Milk + Fruit +	Milk + Fruit	Milk + Fruit	Eggs	Less oil	Horsegram
Vegetables	Banana +	Milk +	Meat	Gogu	Pineapple
Milk + Fruit	Apple	Fruit + vege-	Fish	Banana	Jackfruit
Milk + Sweets	Lemon +	tables		Fish	Drumstick-
Laddu + Sweets	Orange +	Eggs + Milk			leaves
Banana	Grapes +	+ fruit			Tender-
Jalebi + Vadai	Jowar +	Milk + eggs			coconut
Banana +	Sankati +	Milk + Sweets			Guava fruit
Sweets	Ghee	+ fruit			Sweets
Apple + Sweets	Banana +	Fish			
Tender coconut	Lemon juice	Milk + Sweets			
water	Ghee + Fruit	+ Oil prepa-			
Orange	Fruit + Fruit	rations			
	juice				
	Theji + jaggery				

1. In pregnancy the foods commonly promoted among all the three States are milk, fruit and sweets of different types. The foods commonly avoided across the three states are papaya and fish.
2. During lactation, milk and sweets are again promoted among the three states. Pulses like green gram, black gram and bengal gram dhal are promoted in U.P. and Kerala while they are

avoided in A.P. Ghee and butter are exclusively promoted in A.P., fish is promoted in Kerala and harira is exclusive to U.P. Generally, fruits like jack-fruit and mango are avoided during lactation in Kerala and A.P. and in U.P., fish is avoided.

Foods specially Emphasised During Lactation

Promoted			Avoided		
U.P.	A.P.	Kearala	U.P.	A.P.	Kerala
Dhal	Apple + milk	Black gram	Brinjal	Brinjal +	Chilly +
Dhal + Milk	Butter	Green gram	Chilly	Gogu	Tamarind
Dhal + Milk +	Cakes	dhal	Fish	Bengal gram	Ground-
Semia	Coconut water	Eggs + milk	Jack-	dhal, curd	nuts
Eggs + Dhal	+ Banana + Milk	Fish	fruit		Jack-
Eggs + Milk +	Foods prepared	Fruit	Maize	Cucumber	fruit
Pulse	with ghee	Fruit + milk	Milk	Cheese	Jackfruit
Fruit	Grapes	Fish + meat	Meat	Dhal	seeds
Harira	Korai	Fish + leafy	Pumpkin	Green gram	Mango
Harira + Dhal	Lime juice	vegetables	Tamarind	Green	Potato +
Harira + Laddu	Milk biscuits	Fish + Tapioca		leafy	sweet
Harira + Dhal +	cuits	Groundnut		vegetable	potato
Laddu	Milk	Leafy vegetables		Potato +	Pineapple
Harira + Dhal	Milk + Bread	Milk		Fish	
Harira + fruit	Milk + Non-	Milk + Veg.		Ground-	Tamarind
+ dhal	veg.	Milk + Meat		nuts	Tapioca
Milk	Milk + chapati	Milk + sweets		Pumpkin	Wheat
Milk + fruit	Mangoes + milk	Meat + soup		Ridge-	
	Orange + lemon	Milk + fish +		gourd	
	+ apples	Meat + eggs		Tomato	
	Omelette +	Milk + fish +		Mangoes	
	Milk + papaya	Meat + leafy		Mutton	
	Sweets,	vegetables			
	lime juice,				
	bread				
	Sweets + lemon +				
	coconut Tea				

3. It is observed that the consumption of green leafy vegetables is negligible during pregnancy and lactation across all the three states. Green leafy vegetables are actually avoided among the majority during pregnancy and lactation. Education of women

about the nutritional needs of pregnancy and lactation and the right type of foods is necessary.

The practice of fasting during pregnancy and lactation is a significant issue observed in the present study with regard to U.P., where 80.9 percent of the respondents have reported that they resort to fasting at one time or the other. For A.P. and Kerala the corresponding figures are only 11.2 and 10.4 respectively. In U.P. 38.4 percent of the respondents do not take any food at all during fasting days which can be quite detrimental to the wellbeing of an individual during conditions of stress like pregnancy and lactation. Such a practice is almost non-existent in A.P. and Kerala. This may be due to strong religious beliefs and associated traditional food habits.

Table 17.3: *Percent Distribution of Respondents in U.P., A.P. and Kerala by Fasting during Pregnancy and Lactation*

Fasting	U.P.	A.P.	Kerala
No food at all	38.4	0.1	0.1
Take only liquid food	6.0	0.1	–
One meal per day	21.0	2.5	10.3
Two meals per day	15.5	8.5	–
No fasting	19.1	88.8	89.6

Nutritional Status of Infants and Pre-school Children

For assessing the nutritional status of pre-school children, the parameters chosen are weight for age and height for age. The standards for reference are those of more recent studies of normal children reported by Hanumantha Rao, *et al.*, (1976) and Shanti Ghosh (1981). As per the standard practice the 50th percentile of normal children was equated to 100 and the classification of the degree of malnutrition was done as per Gomez (1956). All cases above the 80th percentile were considered normal, those between 60 and 80th percentile as moderately malnourished and those below 60th percentile as severely malnourished. This classification is followed for both females and males.

Weight: Among the three states compared, the percent of normal children is the highest in Kerala at each age level for male as well as for female children. With regard to U.P., the general trend with few exceptions is that the proportion of normal children is the lowest. A.P. is at the midway point up to four years but in the last age group, i.e., at five it is the lowest for both sexes (for males 33.3, for females 38.2 percent). Comparing the proportion of normal children from under one year to the fifth year there is a decline for both sexes in all three states. With regard to values for males the decline is from 82.7 to 44.3; 62.7 to 33.3; 56.7 to 40.5 for Kerala, A.P. and U.P. respectively. With regard to females the declining values are from 75 to 61.1; 66.2 to 38.2; 57.6 to 52.7 for Kerala, A.P and U.P. respectively. The decline of percentage of normal children is greater for boys as compared to that of girls in all the three states. This may be due to greater natural resistance power of girls as compared to boys. At the fifth year the percent values for normal are 40.5, 33.3 and 44.3 for males; 52.7, 38.2 and 61.1 for females in U.P., A.P. and Kerala respectively. It is evident that the children in Kerala have a better nutritional status than children in A.P and U.P. Better health care services and consumption of foods such as tapioca, jackfruit, plantain, coconut and fish may contribute to this higher nutritional status. Considering the moderate degree of malnutrtion for males as well as for females, the incidence is the lowest at all age levels up to 4 years for Kerala compared to the other states. In general the children are more prone to moderate degree of malnutrition from the third year onwards. If we consider the percent of cases of moderate malnutrition from below one year to the third year, the values are 46.8 to 51.5; 34.6 to 45.5; 16.8 to 34.6 for male children of U.P., A.P. and Kerala respectively. With regard to female children the percentage of cases are from 30.6 to 31.6; 29.3 to 36.6; 19.9 to 22.3 for U.P., A.P. and Kerala respectively. This trend can be due to greater chances of infection from the environment at three years and more, and moving away from the immediate family circle and mother's care. Moreover the activity of the children may be more from the third year onwards requiring more nourishment. Comparing the male and female children it is observed that the incidence of moderate malnutrition is generally at a lower level in female children.

Severe malnutrition generally occurs in children, when infection is superimposed on undernourished children and this state is reflected very well through weight. Here again Kerala has the least incidence of severe malnutrition and U.P. has the highest incidence with a few exceptions and A.P. is at a mid-way point. In U.P. the females record a higher incidence of severe malnutrition than the males. This can be a reflection of differential child care practices of females versus males. The better nutritional practices and health care services place Kerala above the other two states with the lowest incidence of severe malnutrition.

Considering the case of severely malnourished children it is observed that the proportion of children suffering from the condition fluctuates from one age group to another with regard to males as well as females, irrespective of the state. This trend can be due to spurts of infection being superimposed on the existing undernourished state of the children. Generally, the proportion of children having severe malnutrition is found to be higher between one to three years as compared to that above three years. The clinical observations amongst these rural pre-school children have shown that anaemia and protein energy malnutritional states occured in a greater percent of the children below three years as compared to those between three to five years (see part iv of the same study, elsewhere).

Height: A child can lose weight but not height when it is subjected to infection and illness. In these circumstances weight is the preferred measurement to height in assessing the health status. Height deficits may be considered indicative of chronic nutritional deprivation and not spurts of malnutrition. In this context the height data obtained in the present study do not indicate the severe cases of malnutrition. Generally the severely malnourished cases are not detected in all the three states for males as well as females at different age levels as per the assessment by height. At age five the incidence of normal cases is highest in Kerala as compared to that of A.P. and U.P. which is at about the same level for both the sexes. This pattern is observed at the lower age levels too.

With this analysis of nutritional practices and nutritional status of families in general and children in particular we came to a better assessment of infant mortality and its differentials and determinants.

Table 17.4: *Nutritional Status of Preschoolers of U.P., A.P. and Kerala as assessed by Weight*

States	Age					
	< 1	1	2	3	4	5
Normal			*Males*			
U.P.	56.7	41.0	39.8	36.8	44.4	40.5
A.P.	62.7	72.1	47.6	51.8	44.8	33.3
Kerala	82.7	77.9	71.1	63.6	57.0	44.3
			Females			
U.P.	57.6	48.7	54.2	61.6	46.6	52.7
A.P.	66.2	48.8	53.3	58.1	60.3	38.2
Kerala	75.0	75.0	76.5	76.6	65.0	61.1
Moderately malnourished			*Males*			
U.P.	46.8	52.6	52.6	51.5	52.8	49.4
A.P	34.6	26.9	44.1	45.5	52.0	61.0
Kerala	16.8	19.8	28.0	34.6	42.0	51.1
			Females			
U.P.	30.6	27.3	34.6	31.6	50.3	33.8
A.P	29.3	47.7	38.1	36.6	48.3	56.4
Kerala	19.9	22.2	22.5	22.3	35.0	36.0
Severely malnourished			*Males*			
U.P.	10.7	12.2	7.6	11.7	2.8	10.4
A.P.	2.7	1.0	8.3	3.2	3.2	5.7
Kerala	0.5	2.3	0.9	1.8	1.0	4.6
			Females			
U.P.	11.8	24.0	11.2	6.8	3.1	13.5
A.P.	4.5	3.5	8.6	5.3	1.4	5.4
Kerala	5.1	2.8	1.0	1.1	-	2.9

States	Total number of children											
	< 1		1		2		3		4		5	
	M	F	M	F	M	F	M	F	M	F	M	F
U.P.	178	144	156	121	196	188	196	206	180	189	154	133
A.P.	185	157	104	86	145	139	187	186	154	149	72	55
Kerala	191	196	86	108	218	196	217	184	200	183	131	139

M = male; F = female

Table 17.5: *Nutritional Status of Preschoolers of U.P., A.P. and Kerala as assessed by Height*

States	Age < 1	1	2	3	4	5
Normal						
				Males		
U.P.	93.5	92.1	88.8	80.1	89.4	89.9
A.P.	99.5	98.1	94.5	91.9	96.1	88.6
Kerala	100.0	97.6	100.0	97.2	96.5	99.9
				Females		
U.P.	94.8	94.2	94.1	82.8	86.3	90.2
A.P.	100.0	100.0	95.7	91.4	95.3	90.7
Kerala	98.9	99.0	99.5	97.3	96.7	97.1
Moderately Malnourished						
				Males		
U.P.	5.9	6.6	11.2	19.9	10.1	10.1
A.P.	0.5	1.9	5.5	8.1	3.9	11.4
Kerala	-	2.4	-	2.8	3.5	3.1
				Females		
U.P.	3.7	5.0	5.9	16.7	13.2	9.8
A.P.	-	-	4.3	8.6	4.7	9.3
Kerala	1.1	1.0	0.5	2.7	3.3	2.2
Severely Malnourished						
				Males		
U.P.	0.6	1.3	-	-	0.5	-
A.P.	-	-	-	-	-	-
Kerala	-	-	-	-	-	-
				Females		
U.P	2.5	0.8	-	0.5	0.5	-
A.P.	-	-	-	-	-	-
Kerala	-	-	-	-	-	0.7

States	Total number of children < 1		1		2		3		4		5	
	M	F	M	F	M	F	M	F	M	F	M	F
U.P	168	134	152	121	196	188	196	204	179	189	158	132
A.P	185	157	103	85	145	138	185	185	154	149	70	54
Kerala	178	185	85	104	217	194	215	183	201	180	129	139

M = Male; F = Female

Nutritional Status of Mothers as per Weight and Height

The median weight calculated from the weight records of mothers is 43.0 kgs, 45.7 kgs, and 45.7 kgs for U.P., A.P. and Kerala respectively and the pooled data for the country is 44.9 kgs. The corresponding median heights are 151 cm., 152 cm., 150 cm., and the pooled height for the country is 150.9 cm. Comparing the three states, the women of A.P. are taller than women of U.P. and Kerala. Considering the weight, however, Kerala women have a higher weight of 45.7 kgs compared to U.P. women (43 kg.). The Andhra women are on par with the average weight of Kerala women. Taking weight and height together it is observed that the women of Kerala measure up to the standard weight and height of Indian women, i.e., 45 kgs and 150 cms. The women of Andhra Pradesh have a weight of 45.7 kgs as against height of 152 cms. while those of U.P. weight only 43 kgs. for height of 151 cms. We can therefore place Kerala women at the first level followed by A.P. and lastly by U.P. with regard to their nutritional status. The same trend has been reported in the nation-wide survey of the National Nutrition Monitoring Bureau for these three states (NNMB, 1980).

In Table 17.6 the percent distribution of respondents across the three states has been classified by weight for height. The expected weight for differing heights has been calculated at the rate of 2.3 Kg. per 1 cm. above the standard of 45 Kgs. for 150 cms. for Indian women (Apte, 1986).[1] For each level of weight for height the classification is grouped into three categories as expected weight below expected weight and above expected weight. The overall picture that emerges places Kerala at a better level of nutrition status than either U.P. or A.P. The percent distribution of the expected and above expected together is 25.7 for Keral, 17.9 for A.P., and 17.3 for U.P. In all the three states the majority of women are at the below expected level of weight for height indicating a greater prevalence of undernourishment. This status is a reflection of multiple factors operating in a culture of poverty which may include

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[1] * Apte, N.V., Diabetes: Dietary Management, *Science Today*, March 1986, pp. 86-87.

Table 17.6: *Percent Distribution of Respondents in U.P., A.P. and Kerala by Weights as related into Heights*

Height in Cms.		U.P.				A.P.				Kerala				India			
	Expected weight Kgs.	Below expected weight	Expected weight weight	Above expected	Total weight	Below expected	Expected weight weight	Above expected	Total weight	Below expected	Expected weight weight	Above expected	Total	Below expected weight	Expected weight	Above expected weight	Total
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
145.0	45.0	87.5 (279)	11.0 (35)	1.5 (5)	319	84.7 (216)	10.2 (26)	5.1 (13)	255	83.8 (353)	9.1 (38)	7.1 (30)	421	85.2 (848)	9.9 (99)	4.8 (48)	995
150.0	45.0	73.7 (432)	18.8 (110)	7.5 (44)	586	79.3 (414)	11.9 (62)	8.8 (46)	522	67.6 (449)	17.6 (117)	14.8 (98)	664	73.1 (1295)	16.3 (289)	10.6 (188)	1772
153.5	53.1	84.1 (570)	12.3 (83)	3.4 (23)	676	84.1 (513)	8.0 (49)	7.9 (48)	610	74.9 (430)	12.9 (74)	12.2 (70)	574	81.3 (1513)	11.1 (206)	7.6 (141)	1860
158.5	64.6	91.6 (240)	8.4 (22)	-	262	82.2 (295)	17.8 (64)	-	359	78.1 (228)	21.9 (64)	-	292	83.6 (763)	16.4 (150)	-	913
161.+	67.0	84.9 (73)	15.1 (13)	-	86	77.6 (97)	22.4 (28)	-	125	65.0 (65)	35.0 (35)	-	100	75.6 (235)	24.4 (76)	-	311
Total		82.6 (1594)	13.6 (263)	3.7 (72)	1929	82.0 (1535)	12.2 (229)	5.7 (107)	1871	74.3 (1525)	16.0 (328)	9.7 (198)	2051	79.5 (4054)	14.0 (820)	6.4 (377)	(5851)

poor purchasing power, poor nutritional practices, infections, food fads and fallacies, high fertility, etc. In this context, further research is indicated to isolate the important variables.

Correlation Co-efficients: Nutritional Status

The following variables under nutritional status that showed certain influence on infant mortality have been considered here. They are: weight of the mother, weight of the male infant, weight of the female infant and foods avoided during pregnancy. Most of the variables showed negative association with infant mortality in all the three states. In their order of importance, in U.P. weight of the male infant, weight of the female infant, weight of the mother and foods avoided during pregnancy have shown their different levels of influence on infant mortality. In A.P., the importance begins with the weight of the male infant, followed by weight of the mother, weight of the female infant and foods avoided during pregnancy. In Kerala, the weight of the mother, weight of the male and female infants, foods avoided during pregnancy showed their sequential influence. However, a statistical significance is noticed with regard to the weight of the male infants in U.P. and A.P. but not in Kerala. Only in U.P. the weight of the female infant is statistically significant.

Table 17.7: *Correlation Co-efficients of Nutritional Status in U.P., A.P. and Kerala*

Nutritional Variables	U.P.	A.P.	Kerala
Weight of the mothers	-.039	-.019	-.096
Weight of the male infants	-.054	-.056	-.023
Weight of the female infants	-.047	-.016	-.023
* Foods avoided during pregnancy	-.026	-.008	-.001

* The food avoided during pregnancy are classified into four levels, namely

1. Avoiding more than one significant food;
2. Avoiding one significant food;
3. Avoiding insignificant foods and
4. No avoidance.

18

Causes of Death of Infants and Children

– K. Mahadevan & B. P. Reddy

The first international classification of deseases (I.C.D.) was completed in 1893 (Poti, 1976).*[1] Since then, a revision has been made from time to time. The seventh revision was made in 1955 by W.H.O. The eighth revision of the I.C.D. which was completed in 1967 made considerable changes in the nomenclature as well as in the classification of diseases. The basic frame of the eighth revision consists of 799 categories of diseases and 200 categories of injury and poisoning. The international certificate of causes of death consists of two parts, viz., the direct causes of death (Part A) and the other significant conditions contributing to death but not related to those in Part B.

In many places in rural areas most of the deaths take place without a doctor attending on the patient and thereby the question of a medical certificate of the cause of death does not arise. All that we have is a fictitious list of deaths reported by the respondents and it is very difficult to draw unanimous conclusion from the data on the causes of infant and childhood mortality. The table given below shows the percentage distribution of infant and child deaths by major causes of death in the three states.

Causes of Infant Mortality

The causes of infant mortality are classified into broad groups of low birth weight, blue babies, tetanus, water-borne diseases, air-borne diseases, nutritional deficiency diseases and other causes of death. Considering the individual causes of death on the basis of

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1. * Poti, B.J., *International Classification of Diseases*, Lecture delivered in National Institute of Nutrition, Hyderabad, 1976 (Mimeo.)

their occurrence across the three states, it can be seen that tetanus is the single major cause of death for a quarter of deaths in U.P. (24.3 %) but to a lower percentage in A.P. (6.7 %) and negligible in Kerala (1.1 %). However, low birth weight forms the single largest cause of death in A.P. and Kerala (13.4 % and 19.1 %) respectively; this is only the second major cause of death in U.P. (10.7 %). This statement cannot be fully depended upon because people in Kerala, because of better education and large scale hospital deliveries they may know the actual causes of death. This is not the case in A.P. and U.P. Hence there might be under-reporting of this cause of death in the latter two states. Percentages of deaths classified under blue babies in Kerala, U.P. and A.P. are 13.7, 5.0 and 0.7 respectively. These deaths occur mostly in the first week itself. This is highest in Kerala compared to U.P. and A.P. because exogenous causes compared to endogenous are more common in Kerala where the group of perinatal causes plays an important role. Waterborne diseases constitute the third major cause of death for infants in A.P. and U.P. and it ranks fourth in Kerala. It also does not significantly differ across these states. Airborne diseases constitute a major cause of death in Kerala (16.1%), but not so in A.P. (5.8%) and U.P. (4.4%). This factor varies widely between Kerala on the one side and U.P. and A.P. on the other. Other causes of deaths such as fits, accidents, delivery problems and other unidentified causes of death constitute together, however, the highest proportion of infant deaths in all the three states; it is highest in A.P. (36.3%) followed by U.P. (34.8%) and lastly in Kerala (23.0%). Another 9.1 percent of deaths in U.P., 22.9 percent in A.P. and 15.3 percent in Kerala have happened due to unknown causes but cited as superstition by the respondents.

Causes of Child Mortality

Unlike the several causes of infant mortality, the major causes of child mortality are confined to air-borne diseases, water-borne diseases, nutritional deficiency diseases and miscellaneous causes like fits, accidents, etc. Water-borne and air-borne diseases constitute the two major causes of death of children in all the three states; other individual diseases are negligible. The airborne and waterborne diseases occur more in Kerala (31.3%, 24%) than in A.P. (17.6%, 22.2%) and U.P. (17.1% and 19.0%). This may be because water is available in plenty throughout Kerala and children may be drinking unsafe water. A combination of causes of death like fits and accidents are equally high in U.P. (41.4%) and A.P. (41.1%) and significantly less in Kerala (27.8%). About 5 to 6 percent of deaths in all the three states have been reported as due to superstition. A tenth of the women in A.P. and U.P. could not give any cause of death because of their ignorance. Such a situation is absent in Kerala due to the better educational status of women in that state.

Table 18: *Percent Distribution of Infant and Child Deaths by Causes of Death in U.P., A.P., Kerala and India*

Causes as reported by respondents	U.P.		A.P.		Kerala		India	
	Infant	Child	Infant	Child	Infant	Child	Infant	Child
Superstition*	9.1 (114)	4.8 (27)	22.9 (154)	6.1 (29)	15.3 (56)	5.3 (7)	14.2 (324)	5.3 (63)
Low birth weight	10.7 (133)	-	13.4 (90)	-	19.1 (70)	-	12.8 (293)	-
Blue babies	5.0 (63)	-	0.7 (5)	-	13.7 (50)	-	5.1 (118)	-
Tetanus	24.3 (303)	-	6.7 (45)	-	1.1 (4)	-	15.4 (352)	-
Diarrhoeal diseases	9.8 (122)	17.1 (97)	11.8 (79)	17.6 (84)	11.2 (41)	33.1 (44)	10.6 (242)	19.1 (225)
Airborne diseases	4.4 (55)	19.0 (108)	5.8 (39)	22.2 (106)	16.1 (59)	24.0 (32)	6.7 (153)	20.9 (246)
Deficiency diseases	-	7.2 (41)	-	1.3 (6)	-	9.8 (13)	-	5.1 (60)
Other causes (viz., fits, accidents, delivery problems etc.)	34.8 (435)	41.4 (235)	36.3 (244)	41.1 (196)	23.0 (84)	27.8 (37)	33.4 (763)	39.7 (468)
No response	1.9 (24)	10.5 (60)	2.4 (16)	11.7 (56)	0.5 (2)	-	1.8 (42)	9.9 (116)
Total	100.0 (1249)	100.0 (568)	100.0 (672)	100.0 (477)	100.0 (366)	100.0 (133)	100.0 (2287)	100.0 (1178)

Most of the major causes of death of infants and children vary across the three states. While several biological, nutritional and poor health delivery practices constitute the major killer of infants, environmental factors constitute the major killer of children. These findings fully agree with another recent comparative study carried out in South Central India on infant and child mortality (Mahadevan, *et al.*, 1985). The authors concluded that: "considering the preceding discussion and comparing the causes of death of infants and children, it may be generalised that infant mortality is caused largely through biofamilial factors and the childhood mortality by the familio-environmental variables".

19

Path Analysis for Mortality

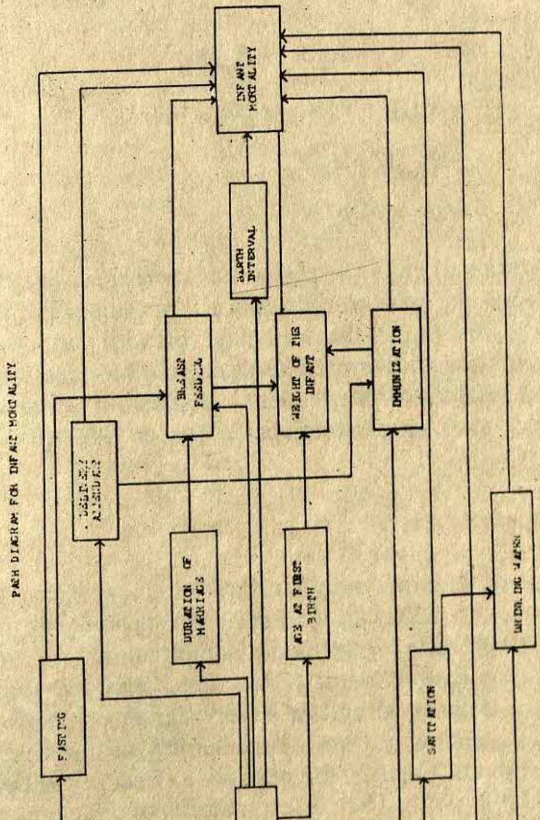
– *K. Mahadevan, M. Sumangala & B. P. Reddy*

To establish a causal link between various independent variables and infant mortality, the path analysis technique has been adopted by using the zero-order correlation matrix for data from the three states. It was followed in preference to regression analysis because of its advantages in explaining direct and indirect influences besides providing the visual manifestation through the diagram.

Path Model

From the overall tabulation made in the preceding chapters on the influence of various independent variables on infant mortality, eleven variables, viz., house sanitation, drinking water source, fasting, wife's education, duration of marraige, age at first birth, delivery attendant, immunization, weight of the infant, duration of breastfeeding and birth interval were found to have significant influence on mortality. Hence these independent variables have been selected for path analysis. All these variables have been selected for path analysis from the three states under study. The path diagram given in Fig. 19.1 provides the causal order of the variables that are influencing infant mortality.

Even though there are many paths through the independent variables reaching the dependent variable (Mortality), a few paths have been selected in calculating the indirect effects. These paths have been selected with a view that they will have the major influence on mortality. Indirect effect by using the limited number of variables for a given path shows a very negligible influence. Hence making all possible ways and finding indirect effect may not give any meaningful results.



Path Diagram for Infant Mortality

The following structural equations have been derived :

1. $Yo = P_{01} X_1 + P_{02} X_2 + P_{03} X_3 + P_{04} + X_4 + P_{05} X_5 + P_{06} X_6$
$+ P_{07} X_7 P_{08} X_8 + P_{09} X_9 + P_{0,10} X_{10} + P_{0,11} X_{11}$

2. $X_9 = P_{98} X_8 + P_{95} X_5 + P_{9,10} X_{10}$

3. $X_8 = P_{83} X_3 + P_{81} X_1 + P_{84} X_4$

4. $X_{10} = P_{10,7} X_7 + P_{10} X_1$

5. $X_6 = P_{6,1} X_1 + P_{6,2} X_2$

Table 19 (a,b,c) gives the zero-order correlation matrix for the three states and the path co-efficients are presented in Tables 19.1 (a,b,c). In Fig. 19.2 (a,b,c) the path diagrams with path co-efficients for three states are illustrated. The direct, indirect and total effects of each of the selected independent variables on infant mortality, separately for each state, are given in Tables 19.2 a(ii), b(ii) and c(ii).

1. *Delivery Attendant*

The type of delivery attendant showed a very high positive effect in Kerala (0.532166) and A.P. (0.280834) and a negligible effect in U.P. (0.088425). From the individual tabulation on the type of delivery attendant (Chapter-XV), it is observed that the influence of the delivery attendant is very significant in Kerala, followed by A.P., mainly due to the availability of different types of delivery attendants. Further, the negligible effect of the delivery attendant in U.P. is noticed because a majority of deliveries are being conducted by the traditional birth attendants alone and the institutional natal care is found to be very negligible. The insignificant indirect effect of the type of delivery attendant through immunization noticed among all the three states uniformly reveals that giving proper training and utilising the delivery attendant will have the maximum effect in reducing infant mortality. This finding clearly reveals the urgency to provide training for the traditional birth attendants and to strengthen the institutional care in states like U.P., which will ultimately help in reducing infant mortality.

2. *Education of Wife*

The education of the wife has a very high negative effect on infant mortality in Kerala (-0.162966) followed by A.P. (-.122128) and a very negligible influence in U.P. (-.097857) as expected. From this it can be clearly inferred that the education of women is one of the major vital factors responsible for the very low infant mortality level found in Kerala. Similarly, the findings on the indirect effect of education of wife through the variables like age at first birth, immunization, sanitation, drinking water and duration of breastfeeding also indicate that its indirect effect is very high in Kerala only. This finding reveals that education of women should be given the highest priority to reduce infant mortality.

3. *Birth Interval*

The birth interval's effect on infant mortality is found to be high in U.P. (-0.137090), followed by Kerala (0.098050) and A.P. (-.089424). The longer the duration of birth interval, the better will be the scope for health of the babies and mothers. Mean duration of closed birth intervals in the three states, however, does not differ much. It is 31, 29 and 31 months each in U.P., A.P. and Kerala respectively. The birth interval between the baby which died and the preceding baby is shorter in U.P. than in A.P. and Kerala. Therefore, the shorter birth interval might have affected the health of the baby leading to his/her death. Hence, appropriate interventions and educational measures are to be considered on a priority basis to educate mothers and all the family members to space the children by at least three or more years to avoid the risk of mortality of infants in future.

4. *Immunization*

Immunization has an inverse relationship with infant mortality. The direct part of this effect as expected is more in Kerala (-0.075981) followed by A.P. (-.030755) and U.P. (-0.007919) The higher value may be due to the good network of infrastructural health care facilities available for children in Kerala. The insignificant impact of this variable noticed in U.P. stresses the urgency of implementing immunization programmes very effectively in that state, which ultimately helps in bringing down the very high infant mortality.

5. *Weight of the Infant*

The effect of weight of the infant is very high in A.P. (-.065397) and U.P. (-.046546) and found to be negligible in Kerala (-.004959). The poor weight noticed for infants in U.P. has also been confirmed on the basis of their poor nutritional status revealed through the iron and protein deficiency as seen under part-iv of this study. The inverse relationship between weight of the infant and the mortality noticed in A.P. and U.P. reveals that the weight of the infants should be improved by implementing the nutritional programmes for expectant and nursing mothers and infants particularly in states like U.P. and A.P., etc.

6. *House Sanitation*

An index on house sanitation has been prepared with the variables, viz., water stagnation, fly nuisance, ventilation, disposal of refuse and animal excreta. House sanitation is found to have a very high negative effect on infant mortality in U.P. (-0.0629196), followed by A.P. (-.032844) and it is very negligible in Kerala (-0.015023). The very high adverse influence in sanitary conditions is noticed in U.P. and to certain extent in A.P. Their predominant effect on infant mortality stresses the need for health education, especially on environmental sanitation, among the people in such states. In this context Kerala is an exception where very good environmental sanitation is noticed throughout the state. It is an ideal condition worth emulating in other places.

The other variables like source of drinking water, fasting, duration of breastfeeding, duration of marriage and age at first birth have shown relatively negligible effect on infant mortality. Among them the influence of the source of drinking water, fasting and age at first birth is the highest in U.P. Further, the very high effect of duration of marriage noticed in Kerala may be due to the fact that the duration of marriage is being influenced by very high age at marriage and it is one of the major determinants for the very low level of infant mortality in this state.

Table 19(a) : *Correlation Matrix – U.P. Mortality*

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	Y_0
X_1	1.000	.126	-.026	-.140	.097	.072	.097	-.061	.031	-.021	.096	-.104
X_2	.126	1.000	-.145	.029	-.019	.126	.025	.019	.007	-.068	.032	-.058
X_3	-.026	-.145	1.000	-.029	.023	-.036	-.071	-.039	.066	.038	.027	-.047
X_4	-.140	.029	-.029	1.000	-.067	-.005	.023	.329	-.174	.045	-.170	.311
X_5	.097	-.019	.023	-.067	1.000	-.021	.006	-.102	.011	.024	.059	-.156
X_6	.072	.126	-.036	-.005	-.021	1.000	.067	.003	.001	-.032	-.033	-.055
X_7	.097	.025	-.071	.023	.006	.067	1.000	.023	.007	.038	-.022	.082
X_8	-.061	.019	-.039	.329	-.102	.003	.023	1.000	.010	.008	-.101	.053
X_9	.031	.007	.066	-.174	.011	.001	.007	.010	1.000	-.020	-.005	-.054
X_{10}	-.021	-.068	.038	.045	.024	-.032	.038	.008	-.020	1.000	.001	.001
X_{11}	.096	-.032	.027	-.170	.059	-.033	-.022	-.101	-.005	.001	1.000	-.149
Y_0	-.104	-.058	-.047	.311	-.156	-.055	.082	.053	-.054	.001	-.149	1.000

Table 19(b) : *Correlation Matrix – A.P. Mortality*

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	Y_0
X_1	1.000	.233	.066	-.068	.263	.225	.073	-.182	-.063	-.038	.097	-.113
X_2	.233	1.000	-.026	.061	.089	.119	.030	-.062	-.039	.043	-.026	-.048
X_3	.066	-.026	1.000	-.012	.051	-.001	.003	-.032	-.015	-.060	.149	-.034
X_4	-.068	.061	-.012	1.000	.024	.024	.056	.264	-.195	.109	-.097	.218
X_5	.263	.089	.051	.024	1.000	.053	-.022	-.156	.008	-.024	.104	-.152
X_6	.225	.119	-.001	.024	.053	1.000	.055	-.119	-.061	-.001	-.011	-.052
X_7	.073	.030	.003	.056	-.022	.055	1.000	-.040	-.012	.070	-.101	.278
X_8	-.182	-.063	-.032	.264	-.156	-.199	-.040	1.000	-.040	.041	-.054	.072
X_9	.063	-.039	-.015	-.195	.008	-.061	-.012	-.040	1.000	-.021	-.043	-.056
X_{10}	-.038	.043	-.060	.109	-.024	-.001	.070	.041	-.021	1.000	-.224	.015
X_{11}	.097	-.026	.149	-.097	.104	-.011	-.101	-.054	-.043	-.224	1.000	-.122
Y_0	-.113	-.048	-.034	.218	-.152	-.052	.278	.072	-.056	.015	-.122	1.000

Table 19(c) : *Correlation Matrix – Kerala Mortality*

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	Y_0
X_1	1.000	.404	.179	-.297	.377	-.098	-.167	-.223	.027	-.006	.184	-.208
X_2	.404	1.000	.003	-.018	.103	-.074	-.113	-.070	-.019	-.013	.074	-.105
X_3	.178	.003	1.000	-.068	.198	-.018	-.042	-.032	.010	.002	.098	-.062
X_4	-.297	-.018	-.068	1.000	-.301	-.032	.191	.400	-.186	-.015	-.112	.245
X_5	.337	.103	.198	-.301	1.000	-.053	-.117	-.197	-.097	-.002	.065	-.140
X_6	-.098	-.074	-.018	-.032	-.053	1.000	.089	.010	.043	-.001	-.071	.052
X_7	-.167	-.113	-.042	.191	-.117	.089	1.000	.069	-.040	.245	-.191	.569
X_8	-.223	-.070	-.032	.400	-.197	.010	.069	1.000	-.060	-.003	-.081	.113
X_9	.027	-.019	.010	-.186	.097	.043	-.040	-.060	1.000	-.011	.013	-.023
X_{10}	-.006	-.013	.002	-.015	-.002	-.001	.245	-.003	-.011	1.000	-.106	.070
X_{11}	.184	.074	.098	-.112	.065	-.071	-.191	-.081	.013	-.106	1.000	-.213
Y_0	-.208	-.105	-.062	.245	-.140	.052	.569	.113	-.023	.070	-.213	1.000

Table 19.1(a) : *Path Co-efficient for Mortality – U.P.*

$P_{0,1}$	-.086871
$P_{0,2}$	-.056333
$P_{0,3}$	-.049455
$P_{0,6}$	-.052275
$P_{0,7}$	.88745
$P_{0,8}$	.036148
$P_{0,9}$	.046546
$P_{0,10}$	-.008868
$P_{0,11}$	-.137090
$P_{2,1}$	-.126
$P_{6,1}$	1.389948
$P_{6,1}$	-.103133
$P_{1,5}$	-.097
$P_{1,4}$	.026
$P_{1,7}$	-.097
$P_{1,11}$	.096
$P_{9,8}$	.011454
$P_{9,5}$	.012658
$P_{9,10}$	.020395
$P_{8,3}$	-.029970
$P_{8,1}$	-.016158
$P_{8,4}$	.325869
$P_{10,7}$	.040417
$P_{10,1}$	-.24920

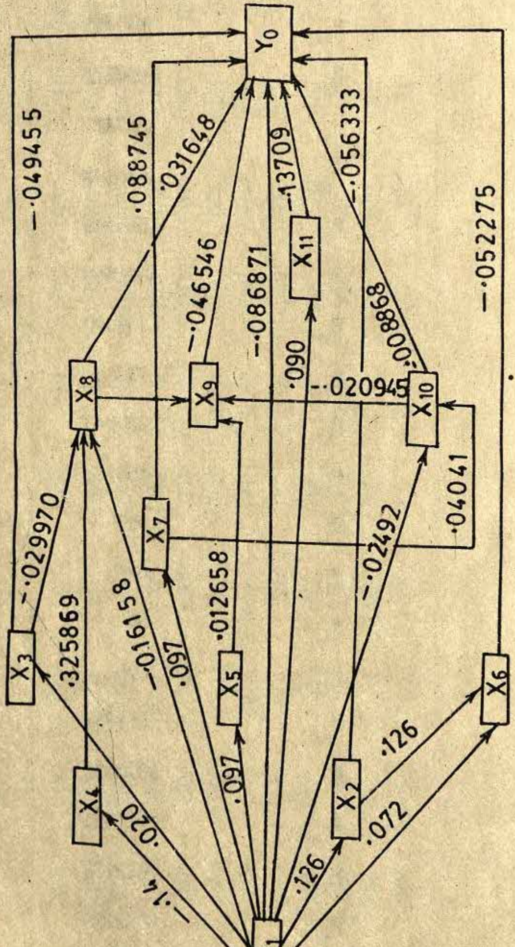

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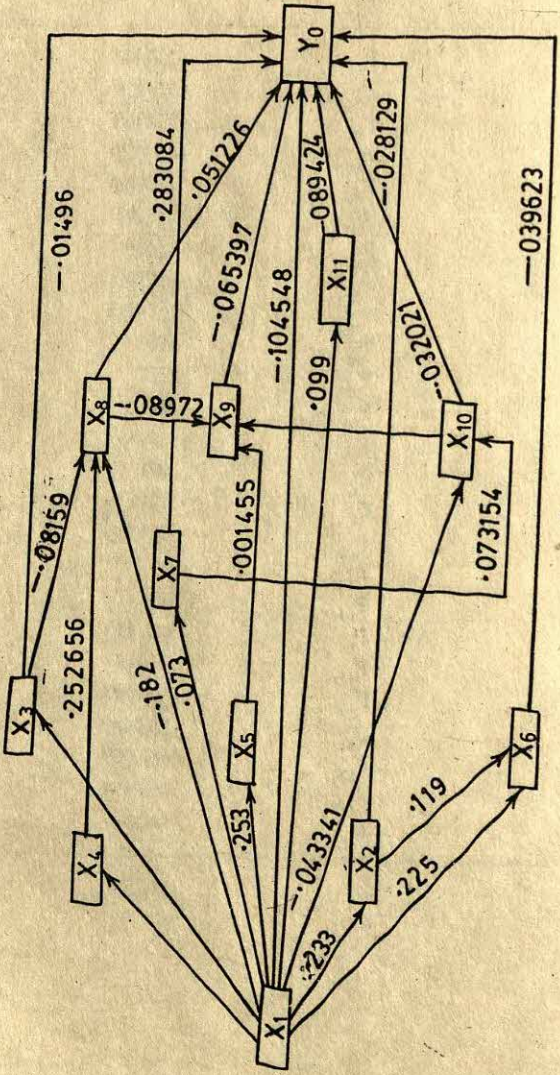
Table 19.1(b) : *Path Co-efficient for Mortality – A.P.*

$P_{0,1}$	-.104548
$P_{0,2}$	-.028129
$P_{0,3}$	-.014960
$P_{0,6}$	-.039623
$P_{0,7}$	.283084
$P_{0,8}$	.051226
$P_{0,9}$	-.065397
$P_{0,10}$	-.032021
$P_{0,11}$	-.089424
$P_{2,1}$	.233
$P_{1,5}$	.263
$P_{1,4}$	.068
$P_{1,3}$	.066
$P_{1,7}$	.073
$P_{6,1}$	.118020
$P_{6,2}$	.915013
$P_{1,11}$	.097
$P_{9,8}$	-.038979
$P_{9,5}$	.001455
$P_{9,10}$	-.019367
$P_{8,3}$	-.018169
$P_{8,1}$	-.163620
$P_{8,4}$	.252656
$P_{10,7}$	.073164
$P_{10,1}$	-.043341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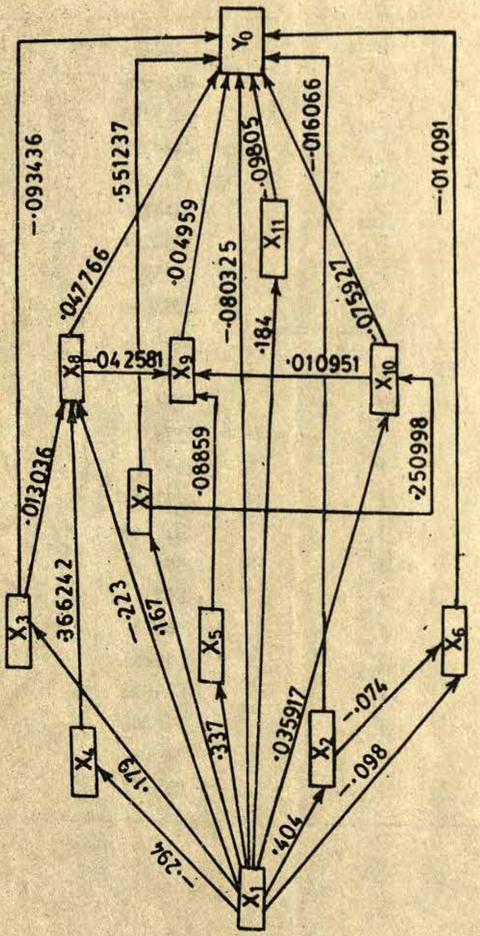
·233
·119
·225

Table 19.1(c) : *Path Co-efficient for Mortality – Kerala*

$P_{0,1}$	-.080325
$P_{0,2}$	-.016066
$P_{0,3}$	-.013436
$P_{0,6}$	-.014091
$P_{0,7}$	.551237
$P_{0,8}$	.047766
$P_{0,9}$	.004959
$P_{0,10}$	-.075927
$P_{0,11}$	-.098050
$P_{2,1}$	.404
$P_{1,5}$	.337
$P_{1,4}$	.294
$P_{1,3}$	.179
$P_{1,7}$	-.167
$P_{6,1}$	-.131161
$P_{6,2}$	-.210108
$P_{1,11}$	.184
$P_{9,8}$	-.042581
$P_{9,5}$	.088590
$P_{9,10}$	-.010951
$P_{8,3}$	.013036
$P_{8,1}$	-.116560
$P_{8,4}$	.366242
$P_{10,1}$	.250998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·167
·337
·035917
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·179
−·294
·404
−·098

Table 19.2(a)(i) : *Direct and Indirect effects of Variables on Mortality – U.P.*

Direct Effect

$X_1 \rightarrow Y\ (P_{0,1})$	-.086871
$X_2 \rightarrow Y\ (P_{0,2})$	-.056333
$X_3 \rightarrow Y\ (P_{0,3})$	-.049455
$X_6 \rightarrow Y\ (P_{0,6})$	-.052275
$X_7 \rightarrow Y\ (P_{0,7})$	.088745
$X_8 \rightarrow Y\ (P_{0,8})$	.031648
$X_9 \rightarrow Y\ (P_{0,9})$	.046546
$X_{10} \rightarrow Y\ (P_{0,10})$	-.008868
$X_{11} \rightarrow Y\ (P_{0,11})$	-.137090

Indirect Effect

$X_1 \rightarrow X_2 \rightarrow Y$	$(P_{2,1} \rightarrow P_{0,2})$	-.0070979
$X_1 \rightarrow X_2 \rightarrow X_6 \rightarrow Y$	$(P_{2,1} \rightarrow P_{6,2} \rightarrow P_{0,6})$	-0.0008922
$X_1 \rightarrow X_3 \rightarrow Y$	$(P_{3,1} \rightarrow P_{0,3})$	0.0012858
$X_1 \rightarrow X_3 \rightarrow X_8 \rightarrow Y$	$(P_{3,1} \rightarrow P_{8,3} \rightarrow P_{0,8})$	0.0000246
$X_1 \rightarrow X_3 \rightarrow X_8 \rightarrow X_9 \rightarrow Y$	$(P_{3,1} \rightarrow P_{8,3} \rightarrow P_{9,8} \rightarrow P_{0,9})$	-0.0000004
$X_1 \rightarrow X_6 \rightarrow Y$	$(P_{6,1} \rightarrow P_{0,6})$	0.0037638
$X_1 \rightarrow X_7 \rightarrow Y$	$(P_{7,1} \rightarrow P_{0,7})$	0.0086082
$X_1 \rightarrow X_7 \rightarrow X_{10} \rightarrow Y$	$(P_{7,1} \rightarrow P_{10,7} \rightarrow P_{0,10})$	-0.0000347
$X_1 \rightarrow X_7 \rightarrow X_{10} \rightarrow X_9 \rightarrow Y$	$(P_{7,1} \rightarrow P_{10,7} \rightarrow P_{9,10} \rightarrow P_{0,9})$	0.0000037
$X_1 \rightarrow X_8 \rightarrow Y$	$(P_{8,1} \rightarrow P_{0,8})$	-0.0019305
$X_1 \rightarrow X_8 \rightarrow X_9 \rightarrow Y$	$(P_{8,1} \rightarrow P_{9,8} \rightarrow P_{0,9})$	0.0000325

$X_1 -6X_6 - Y$	$(P_{10,1} - P_{0,10})$	0.0002209
$X_1 \rightarrow X_6 - X_9 \rightarrow Y$	$(P_{10,1} \rightarrow P_{9,10} \rightarrow P_{0,9})$	-0.0000236
$X_1 \rightarrow X_{11} - Y$	$(P_{11,1} \rightarrow P_{0,11})$	-0.0131606
$X_1 \rightarrow X_4 \rightarrow X_8 \rightarrow Y$	$(P_{4,1} \rightarrow P_{8,4} - P_{0,8})$	-0.0014438
$X_1 \rightarrow X_4 \rightarrow X_8 \rightarrow {}_{X9} \rightarrow Y$	$(P_{4,1} \rightarrow P_{8,4} \rightarrow P_{9,8} \rightarrow P_{0,9})$	0.0000243
$X_1 \rightarrow X_5 \rightarrow X_9 \rightarrow Y$	$(P_{9,8} \rightarrow P_{9,5} P_{0,9})$	-0.0000571
$X_2 \rightarrow X_6 \rightarrow Y$	$(P_{6,2} \rightarrow P_{0,6})$	-0.0065866
$X_3 \rightarrow X_8 \rightarrow Y$	$(P_{8,3} \rightarrow P_{0,8})$	-0.0009484
$X_3 \rightarrow X_8 \rightarrow X_9 \rightarrow Y$	$(P_{8,3} \rightarrow P_{9,8} \rightarrow P_{0,9})$	0.0000159
$X_4 \rightarrow X_8 \rightarrow Y$	$(P_{8,4} \rightarrow P_{0,8})$	0.0103131
$X_4 \rightarrow X_8 \rightarrow X_9 \rightarrow Y$	$(P_{8,4} \rightarrow P_{9,8} \rightarrow P_{0,9})$	-0.0001737
$X_5 \rightarrow X_9 \rightarrow Y$	$(P_{9,5} \rightarrow P_{0,9})$	-0.0005891
$X_7 \rightarrow X_{10} \rightarrow Y$	$(P_{10,7} \rightarrow P_{0,10})$	-0.0003584
$X_7 \rightarrow X_{10} \rightarrow X_9 \rightarrow Y$	$(P_{10,7} \rightarrow P_{9,10} \rightarrow P_{0,9})$	0.0000383
$X_8 \rightarrow X_9 \rightarrow Y$	$(P_{9,10} \rightarrow P_{0,9})$	-0.0005331
$X_{10} \rightarrow X_9 \rightarrow Y$	$(P_{9,10} \rightarrow P_{0,9}$	0.0009493

Table 19.2 (b) (i): *Direct and Indirect Effects of Variables on Mortality – A.P.*

Direct Effect		
$X_1 - Y -$	$(P_{0,1})$	-.104548
$X_2 \to Y \to$	$(P_{0,2})$	-.028129
$X_3 \to Y \to$	$(P_{0,3})$	-.014960
$X_6 \to Y \to$	$(P_{0,6})$	-.039623
$X_7 \to Y$	$(P_{0,7})$	.283084
$X_8 \to Y$	$(P_{0,8})$	.051226
$X_9 \to Y$	$(P_{0,9})$	-.065397
$X_{10} - Y$	$(P_{0,10})$	-.032021
$X_{11} \to Y$	$(P_{0,11})$	-.089424
Indirect Effect		
$X_1 \to X_2 \to Y$	$(P_{2,1} - P_{0,2})$	-.006554
$X_1 \to X_2 \to X_6 \to Y$	$(P_{2,1} \to P_{6,2} \to P_{0,6})$	-.008528
$X_1 \to X_3 \to Y$	$(P_{3,1} \to P_{0,3})$	-.0009873
$X_1 \to X_3 \to X_8 \to Y$	$(P_{3,1} \to P_{8,3} \to P_{0,8})$	-.0000614
$X_1 \to X_3 \to X_8 \to X_9 \to Y$	$(P_{3,1} \to P_{8,3} \to P_{9,8} \to P_{0,9})$	.000003
$X_1 \to X_6 \to Y$	$(P_{6,1} \to P_{0,6})$	-.00472
$X_1 \to X_7 \to Y$	$(P_{7,1} \to P_{0,7})$	.0206651
$X_1 \to X_7 \to X_{10} \to Y$	$(P_{7,1} \to P_{10,7} - P_{0,10})$	-.0017102
$X_1 \to X_7 \to X_{10} \to X_9 \to Y$	$(P_{7,1} \to P_{10,7} \to P_{9,10} \to P_{0,9})$	.0000067
$X_1 \to X_8 \to Y$	$(P_{8,1} \to P_{0,8})$	-.0093231
$X_1 \to X_8 \to X_9 \to Y$	$(P_{8,1} \to P_{9,8} \to P_{0,9})$	-.0004639
$X_1 \to X_{10} \to Y$	$(P_{10,1} - P_{0,10})$	.0013878
$X_1 \to X_{10} \to X_9 \to Y$	$(P_{10,1} \to P_{9,10} \to P_{0,9} P$	.0000548
$X_1 \to X_{11} \to Y$	$(P_{11,1} \to P_{0,11})$	-.0086741
$X_1 \to X_4 \to X_8 \to Y$	$(P_{4,1} \to P_{8,4} \to P_{0,8})$	-.00088
$X_1 \to X_4 \to X_8 \to X_9 \to Y$	$(P_{4,1} \to P_{8,4} \to P_{9,8} \to P_{0,9})$	-.0000437
$X_1 \to X_5 \to X_9 \to Y$	$(P_{5,1} \to P_{9,5} \to P_{0,9})$	-.000025
$X_2 \to X_6 \to Y$	$(P_{6,2} \to P_{0,6})$	-.0366
$X_3 \to X_8 \to Y$	$(P_{8,3} \to P_{0,8})$	-.0009307
$X_3 \to X_8 \to X_9 \to Y$	$(P_{8,4} \to P_{9,8} \to P_{0,9})$	-.0000468
$X_4 \to X_8 \to Y$	$(P_{8,4} \to P_{0,8})$	-.0129425
$X_4 \to X_8 \to X_9 \to Y$	$(P_{8,4} \to P_{9,8} \to P_{0,9})$	.000644
$X_5 \to X_9 \to Y$	$(P_{9,5} \to P_{0,9})$	-.0000951
$X_7 \to X_{10} \to Y$	$(P_{10,7} \to P_{0,10})$	-.0023427
$X_7 \to X_{10} \to X_9 \to Y$	$(P_{10,7} \to P_{9,10} \to P_{0,9})$	.0000926
$X_8 \to X_9 \to Y$	$(P_{9,8} \to P_{0,9})$	.0025491
$X_{10} - X_9 \to Y$	$(P_{9,10} \to P_{0,9})$	.0012665

Table 19.2(c) (i): *Direct, Indirect Effects of Variables on Mortality – Kerala*

Direct Effect		
	$(P_{0,1})$	-.080325
	$(P_{0,2})$	-.016066
	$(P_{0,3})$	-.013436
	$(P_{0,6})$	-.014091
	$(P_{0,7})$	.551237
	$(P_{0,8})$	.047766
	$(P_{0,9})$	.004959
	$(P_{0,10})$	-.0759227
	$(P_{0,11})$	-.098050
Indirect Effect		
$X_1 - X_2 \rightarrow Y$	$(P_{2,1} - P_{0,2})$	-0.006491
$X_1 \rightarrow X_2 \rightarrow X_6 \rightarrow Y$	$(P_{2,1} \rightarrow P_{6,2} \rightarrow P_{0,6})$	0.001188
$X_1 \rightarrow X_3 \rightarrow Y$	$(P_{3,1} \rightarrow P_{0,3})$	-0.002405
$X_1 \rightarrow X_3 \rightarrow X_8 \rightarrow Y$	$(P_{3,1} \rightarrow P_{8,3} \rightarrow P_{0,8})$	0.050100
$X_1 \rightarrow X_3 \rightarrow X_8 \rightarrow X_9 \rightarrow Y$	$(P_{3,1} \rightarrow P_{8,3} \rightarrow P_{9,8} \rightarrow P_{0,9})$	-0.000001
$X_1 \rightarrow X_6 \rightarrow Y$	$(P_{6,1} \rightarrow P_{0,6})$	0.001836
$X_1 \rightarrow X_7 \rightarrow Y$	$(P_{7,1} \rightarrow P_{0,7})$	-.0092057
$X_1 \rightarrow X_7 \rightarrow X_{10} \rightarrow Y$	$(P_{7,1} \rightarrow P_{10,7} \rightarrow P_{0,10})$	0.003183
$X_1 \rightarrow X_7 \rightarrow X_{10} \rightarrow X_9 \rightarrow Y$	$(P_{7,1} \rightarrow P_{10,7} \rightarrow P_{9,10} \rightarrow P_{0,9})$	.000023
$X_1 - X_8 \rightarrow Y$	$(P_{8,1} - P_{0,8})$	-.010652
$X_1 \rightarrow X_8 \rightarrow X_9 \rightarrow Y$	$(P_{8,1} \rightarrow P_{9,8} \rightarrow P_{0,9})$	0.000047
$X_1 \rightarrow X_{10} \rightarrow Y$	$(P_{10,1} \rightarrow P_{0,10})$	-0.002727
$X_1 \rightarrow X_{10} \rightarrow X_9 \rightarrow Y$	$(P_{10,1} \rightarrow P_{9,10} \rightarrow P_{0,9})$	-0.000002
$X_1 \rightarrow X_{11} \rightarrow Y$	$(P_{11,1} \rightarrow P_{0,11})$	-0.018060
$X_1 \rightarrow X_4 \rightarrow X_8 \rightarrow Y$	$(P_{4,1} \rightarrow P_{8,4} \rightarrow P_{0,8})$	-0.005143
$X_1 \rightarrow X_4 \rightarrow X_8 \rightarrow X_9 \rightarrow Y$	$(P_{4,1} \rightarrow P_{8,4} \rightarrow P_{9,8} \rightarrow P_{0,9})$	+.000023
$X_1 \rightarrow X_5 \rightarrow X_9 \rightarrow Y$	$(P_{5,1} \rightarrow P_{9,5} \rightarrow P_{0,9})$	0.000148
$X_2 \rightarrow X_6 \rightarrow Y$	$(P_{6,2} \rightarrow P_{0,6})$	0.002940
$X_3 \rightarrow X_8 \rightarrow Y$	$(P_{8,3} \rightarrow P_{0,8})$	0.000623
$X_3 \rightarrow X_8 \rightarrow X_9 \rightarrow Y$	$(P_{8,3} \rightarrow P_{9,8} \rightarrow P_{0,9})$	-0.000003
$X_4 \rightarrow X_8 \rightarrow Y$	$(P_{8,4} \rightarrow P_{0,8})$	0.017494
$X_4 \rightarrow X_8 \rightarrow X_9 \rightarrow Y$	$(P_{8,4} \rightarrow P_{9,8} \rightarrow P_{0,9})$	-0.000773
$X_5 \rightarrow X_9 \rightarrow Y$	$(P_{9,5} \rightarrow P_{0,9})$	0.000440
$X_7 \rightarrow X_{10} \rightarrow Y$	$(P_{10,7} \rightarrow P_{0,10})$	-0.019058
$X_7 \rightarrow X_{10} \rightarrow X_9 \rightarrow Y$	$(P_{10,7} \rightarrow P_{9,10} \rightarrow P_{0,9})$	-0.000014
$X_8 \rightarrow X_9 \rightarrow Y$	$(P_{9,8} \rightarrow P_{0,9})$	-0.000211
$X_{10} \rightarrow X_9 \rightarrow Y$	$(P_{9,10} \rightarrow P_{0,9})$	-0.000054

Table 19.2(a)(ii): *Direct, Indirect and Total Effects of 11 Variables on Mortality – U.P.*

Variables	Direct Effect	Indirect Effect	Total Effect
1. Wife's Education (X_1)	-0.086871	-0.0106147	-0.097857
2. House Sanitation (X_2)	-0.056333	-0.072694	-0.129027
3. Fasting (X_3)	-0.049455	-0.0009325	-0.0503895
4. Duration of Marriage (X_4)	-	0.0101394	0.0101394
5. Age at First Birth (X_5)	-	-0.0005891	-0.0005891
6. Drinking Water (X_6)	0.052275	-	0.052275
7. Delivery Attendant (X_7)	0.088745	-0.0003201	0.0884249
8. Duration of Breast-feeding (X_8)	.031648	-0.0005331	0.0311149
9. Weight of the Infant (X_9)	-.046546	-	-0.046546
10. Immunization of Child (X_{10})	-.008868	0.0009493	-0.0079187
11. Birth Interval (X_{11})	-.137090	-	-0.137090

Table 19.2(b)(ii): *Direct, Indirect and Total Effects of 11 Variables on Mortality – A.P.*

Variables	Direct Effect	Indirect Effect	Total Effect
1. Wife's Education (X_1)	-.104548	-.016727	-.1221275
2. House Sanitation (X_2)	-.028129	-.036600	-.064729
3. Fasting (X_3)	-.014960	-.000977	-.015937
4. Duration of Marriage (X_4)	-	.0135869	.0135869
5. Age at First Birth (X_5)	-	-.0000951	-.0000951
6. Drinking Water (X_6)	-.039623	-	-0.39623
7. Delivery Attendant (X_7)	.283084	-.0022501	.2808339
8. Duration of Breast-feeding (X_8)	.051226	.0025491	.053817
9. Weight of the Infant (X_9)	-.065397	-	-.065397
10. Immunization of Child (X_{10})	-.032021	.0012665	-.0307545
11. Birth Interval (X_{11})	-.089424	-	-.089424

Table 19.2(c)(ii): *Direct, Indirect and Total Effects of 11 Variables on Mortality – Kerala*

Variables	Direct Effect	Indirect Effect	Total Effect
1. Wife's Education (X_1)	-0.080325	-.082641	.0162966
2. House Sanitation (X_2)	-0.016066	0.002940	-0.013126
3. Fasting (X_3)	-0.013436	0.00062	-0.012816
4. Duration of Marriage (X_4)	-	0.016721	0.016721
5. Age at First Birth (X_5)	-	0.000440	0.000440
6. Drinking Water (X_6)	-0.014091	-	-0.014091
7. Delivery Attendant (X_7)	0.551237	-0.019072	0.532166
8. Duration of Breast-feeding (X_8)	0.047766	-0.000211	0.047555
9. Weight of the Infant (X_9)	0.004959	-	0.004959
10. Immunization of Child (X_{10})	-0.075927	-0.000054	-0.075981
11. Birth Interval (X_{11})	-0.098050	-	-0.098050

Table 19.3: *Path Analysis Results for Mortality*

Total Effect	U.P.	A.P.	Kerala
1. Delivery Attendant (+)	Negligible 3	2	1
2. Wife's Education (-)	3	2	1
3. Birth Interval (-)	1	3 (Negligible difference between A.P. and Kerala)	2
4. Immunization (-)	3	2	1
5. Weight of the Infant (-)	2	1	3
6. House Sanitation (-)	1	2	Very negligible 3
7. Drinking Water	1	2	3
8. Fasting (-)	1	2	3
9. Duration of Breastfeeding (+)	3	2	1
10. Duration of Marriage (+)	3	2	1
11. Age of First Birth (-)	1	3	2

Table 19.4: *Path Analysis Results for Mortality*

Variables	Direct Effect			Indirect Effect		
	U.P.	A.P.	Kerala	U.P.	A.P.	Kerala
1. Delivery Attendant	3	2	1		Very Negligible	
2. Wife's Education	2	1	3	3	2	1 (very high)
3. Birth Interval		Only direct				
4. Immunization	3	2	1		Very Negligible	
		Very high uniformly				
5. Weight of the Infant		Only direct				
6. House Sanitation	1	2 (very high)	3		Very Negligible uniformly	
7. Drinking Water		Only direct				
8. Fasting	1	2 (very high)	3		Very Negligible	
9. Duration of Breast-feeding	3	1	2		Negligible Effect	
10. Duration of Marriage					Only direct	
11. Age of First Birth					Only indirect effect	

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Summary and Implications

Mortality Trends and Differentials

Infant mortality rates for this population by 1984 were 117, 85 and 32 for U.P., A.P. and Kerala respectively. According to the SRS of 1980 they were 167, 103 and 41 and by 1981, 157, 93 and 40 respectively. District-wise also the IMR varied on a differential basis. While the Trivandrum district in Kerala has the lowest IMR of 33, Jhansi (117) and Gorakhpur (116.7) districts in U.P. manifest the highest rates of infant mortality. In Andhra Pradesh, unexpectedly, Kurnool district which is a backward area, has an IMR of 71 as against an IMR of 108 in Guntur district, though the latter is far more developed in all aspects than the former. Mean infant mortality experienced by the couple also varied significantly among these states; it was 0.6, 0.3 and 0.2 in U.P., A.P. and Kerala respectively. Child mortality is highest in A.P., followed by U.P. and it is the lowest in Kearla.

Implications : Future investment in health promotion in different states may be on the basis of the level of IMR prevailing in a states besides the morbidity patterns. States with high incidence of infant mortality may be allocated more funds for the survival of the babies born and by doing so enable the couple not to go in for extra/unwanted children. In view of the differential mortality and the determinants noticed across these states appropriate emphasis in the programme based on the determinants of mortality may be planned for different regions.

Demographic Variables and Mortality

Death of infants occurring on the same day after birth constitutes 15.4 percent which does not differ much across these three states. Considering the neonatal mortality in general is the highest in Kerala (68.3 %), followed by A.P. (60.2 %). It is the lowest in U.P. (55.5 %) which is contrary to the general belief. Other important demographic variables that shows significant positive or negative association with infant mortality are the following. Age of the mother, desire for extra children, unwanted babies born, are all positively associated with infant mortality in all the three states. But age at first birth, birth interval etc., are negatively correlated with mortality.

Implications : (i) Since the largest chunk of infant mortality happens during the neontal period most of our efforts must be directed to tackle the determinants of neonatal mortality.

(ii) Future mortality studies may focus more attention on determinants of neonatal mortality besides studying infant mortality in general.

(iii) Either age at marriage may be delayed for girls or their first childbirth may be postponed to 20 years and above to avoid the possible risk involved in neonatal mortality.

(iv) Since more babies and unwanted babies have greater risk in life, the couples can be educated not to have more children in order to avoid such human wastage.

(v) Earnest and all-round efforts may be made to increase the inter-birth interval for the health and survival of babies as well as mothers.

Socio-Cultural Variables

Socio-cultural variables that show significant differential influence on infant mortality are: religion and caste, fasting during and after pregnancy, type of family, education of mother, education of father, and economic status of the family. Mortality varied significantly among certain religious and caste groups in all the three states; it is lowest among the forward castes in Kerala and A.P. and among the Muslim women in U.P. It is highest among the SC and ST in U.P. and Kerala and the Muslims in A.P. and others fall midway between them. Those women who fast for religious or social reasons tend to manifest significantly more infant mortality than those who do not. As a result of fasting by mothers during pregnancy, the babies born have low weight. Infant mortality is uniformly highest in nuclear families, followed by transitional families. The lowest incidence is in joint families in all the three states. Education of mothers and fathers, and family income show a pronounced negative association with mortality experience of the parents. Thus, socio-economic status and culture together have considerable influence on the incidence of infant mortality and its differences within and across the three states.

Implications : (i) Since fasting during pregnancy and lactation period affects the growth of the baby and its nutritional status, parents may be educated not to fast during pregnancy and lactation periods. It is the first time that the importance of this variable has been identified in mortality literature.

(ii) Though the family type has been studied in relation to fertility it has not yet been studied under infant mortality, so far. It is fascinating to note that encouraging delivery and infant care at home reduces the risk of mortality. This custom which is now dying away, may be revived and strengthened for the health and survival of infants and children.

(iii) It is needless to state that improvement in education and economic status can minimise infant mortality. Therefore, certain financial aid, supplementary nutritious feeding programmes and adult education for pregnant mothers can drastically minimise infant mortality. The same opportunity and programme can motivate the same couple to accept family planning also.

Ecology and Mortality

Ecological variables, viz., type of house, number of rooms in a house, ventilation, environmental sanitation, particularly nuisance of sullage and flies, have been found to be important factors affecting infant mortality differentially in the three states and also within the same state. In pucca houses infant death has been the lowest in all the three states and it has been the highest uniformly in all places in kutcha houses. While most of the respondents in Kerala (80.2%) live in houses with fairly adequate space (three and more rooms) far fewer people in U.P. (33.5%) and A.P. (28.4%) live in similar houses. The number of rooms owned by the respondents in their houses shows a negative association with their experience of infant mortality. It is more pronounced in Kerala and A.P. but is less so in U.P. Similarly, the level of environmental sanitation of the house also shows a pronounced negative association in all the states but again it is more important in Kerala as expected and almost the same in the other two states. Hygienic practices followed for cleaning the feeding bottle and nipple also show a similar trend. Another interesting ecological feature is in Guntur district of A.P. where the IMR is significantly more than in Kurnool district in the same state. This is unexpected because Guntur district is far more developed than the Kurnool district in all aspects. The only reason that is perhaps fairly known is that water stagnation and ecological features noticed in this district are favourable for high incidence of infant mortality.

Implications : (i) Very often ecological factors are not given to due recognition in planning preventive measures against infant mortality, as evident from the high incidence of infant mortality in Guntur district of A.P. Therefore, control of adverse aspects of human ecology may form a major measure in the overall improvement of environment to control infant and childhood mortality.

(ii) Health education about maintaining personal hygiene by all the members of the family may be stressed in schools, families and through all the media on a regular basis.

(iii) Environmental sanitation may be given high priority in the current and future plan periods.

(iv) Mothers and other family members who take care of babies may be educated to observe strict hygienic practices to avoid infection to babies through contact, beverages and other food items by keeping the vessels and hands always clean.

(v) Flies should not be allowed to infest the food items and therefore all family members are to be educated to keep the foods covered with suitable vessels and to keep the surroundings clean to prevent fly nuisance.

Health Delivery System

Health care utilization significantly varies in these three states. In Kerala 90 percent of the respondents made use of the existing health care facilities. However, only 46% in U.P. and 52% in A.P. made use of them. Out of the infants that died, 54 percent in U.P, 48.4 percent in A.P. and a negligible 5 percent in Kerala did not get any medical attention during their illnesses. Such differences in utilization of medical services significantly explain the intra- and inter-state variations in infant mortality. Though some babies received medical aid, 60 percent in U.P., 34 percent in A.P. and only 22 percent in Kerala state did not get medical aid from qualified persons. Of the mothers who lost their infants, an overwhelming percent in U.P. (94%), somewhat lower percent in A.P. (76%), and only a third of them (35%) in Kerala, received delivery care from untrained dais or relatives. During pregnancy medical care is differentially received in these states; while 97.3 percent of the infants who died in U.P. 79.5 percent in A.P. and only 63 percent cases in Kerala did not get proper medical care during their mothers' pregnancy period, which speaks about the gross neglect of service facility by clients and service staff, particularly in U.P. and A.P. The instruments used for cutting the umbilical cord have to be generally improved. In the case of 13 to 30 percent of instances in these states, even unsterilized instruments have been used to cut the cord. This practice often leads to tetanus and the death of infants and mothers. An overwhelming percent of infants that died in U.P. (91.4%) and A.P. (92.7%) had the risk of their mouths being cleaned after delivery by bare hands without proper gloves. However, in Kerala, in most instances sterilized gloves were used. This unscientific practice may result in different ailments to the newborn. Even this practice might have contributed to differential infant mortality between Kerala and the other two states.

Implications : (i) Since most of the existing health centres are not being utilized by the clients, necessary all-round improvements and efforts may be made to attract the clients to them.

(a) From time to time necessary information may be passed on to the clients to familiarise themselves with the use of health centres.

(b) Organizational study of health centres may be carried out periodically to identify bottlenecks, and to improve their service utilisation.

(ii) Most clients in U.P. and such other states depends upon unqualified persons for medical service. This state of affairs needs to be changed as soon as possible through appropriate programmes so as to minimise morbidity and mortality and to increase family planning adoption.

(a) These unqualified persons whose services are sought may be trained in proper medical service so that their adverse influence on health and family planning programme is checked.

(iii) All the untrained *dais* may be recruited and given periodic training on a continuing basis not only to reduce their harmful/risky service to mothers and children but also to help them to contribute to society.

(iv) Existing large scale neglect of medical check-up of the mother during pregnancy, especially in the northern states, may be urgently reduced by adopting suitable administrative and service procedures. This will minimise colossal human wastage.

(v) Sterilized medical kits with knife/scissors may be given to all trained and untrained *dais*, and all pregnant mothers from their 8th month onwards and they may be trained to use them hygienically.

(vi) Sterilised gloves also may be enclosed in the medical kit to clean the baby's mouth after delivery.

General Causes of Death

Considering the individual causes of death of babies and their differential occurrence across the three states, it can be seen that tetanus is the single major cause of death for a quarter of deaths in U.P. (24.3%) but it is negligible in A.P. (6.7%) and Kerala (1.1%). However, low birth weight in A.P. (13.4%) and Kerala (19.1%) forms the single largest cause of death, which is only the second major cause of death in U.P. (10.7%). These figures cannot be fully relied upon, however, the birth weight in Kerala may be recorded more accurately because of large-scale hospital deliveries and better education of mothers, it is not possible in the case of the other two states. Diarrhoeal diseases also constitute a major cause of death in U.P. and A.P., besides a few other common causes. For children, diarrhoeal diseases, airborne diseases and nutritional deficiency diseases are commonly reported.

Implications : For formulating effective preventive and curative care among the infants and children the root causes of the major morbidity pattern may have to be examined to formulate appropriate and effective policies.

(i) Since tetanus is a major cause of infant death, TT injection may be given to all the mothers during the pregnancy period. Subsequentally they may be assured of delivery care with optimum hygiene, a sterilized knife for removing the umbilical cord, timely education, counselling and follow-up services.

Maternity centres may be established on a preferential basis for all slum areas and remote rural areas to prevent tetanus and other delivery problems.

Nutritional Status, Breastfeeding and Weaning Practices

Nutritional status varies considerably across the three states. In the choice of three balanced meals per day, Kerala stands first, followed by A.P. and U.P. Non-vegetarian foods such as fish and meat are consumed to greater extent among families of Kerala and A.P. while vegetarian foods predominate in U.P. This may be due to religious beliefs and non-availability of non-vegetarian foods in interior regions, specially items such as fish. The choice of green leafy vegetables and fruit is minimal across the three states. In fact green leafy vegetables are rarely used and this situation needs to be corrected urgently. This pattern of choice of foods across the three states extends to weaning foods also. Home processing and prepartion of foods is again better in Kerala as compared to A.P. and U.P.

The practice of fasting can play a signifaicant role in that nutrient deprivation can occur during conditions of stress as in pregnancy and lactation and these have an impact on the newborn baby. The proportion of people fasting is remarkably high in U.P. (65.5%) followed by Kerala (10.3%) and least in A.P. (2.7%). In U.P. this practice is particularly severe in contrast to Kerala and A.P. When the mean weight of infants below 4 months was related to the fasting pattern of the mothers across the three states, it is observed that weight of infants is more in the non-fasting group than that observed in the fasting group.

The nutritional status of infants and pre-school children of Kerala is superior to that of children in A.P. and U.P. The proportion of normal children is the highest in Kerala at each age level for male as well as for female children. With regard to U.P. the general trend with a few exceptions is that the proportion of normal children is the lowest, irrespective of age and sex. Andhra Pradesh is at the mid-way point. Regarding severe malnutritional status of children, it is the highest in U.P. A.P. is at the mid-way point and the lowest is in Kerala. In U.P., female children manifest a higher incidence of malnutrition than male children which speaks of the neglect of female children in U.P., the reasons for which are cited elsewhere. The proportion of children with severe malnutrition is generally seen more between one to three years as compared to those above three years. Clinical observations done in a micro-level study among pre-school children of the same areas in the three states have shown that anaemia and protein energy malnutritional status occur in a greater pecent of the children below three years compared to more between three to five years. As far as the growth of pre-school children in terms of mean weight and height measurements for age is concerned the children in Kerala are at a better level than those in A. P. and U. P.

Long duration of breastfeeding and early weaning practices together have a certain impact in controlling infant mortality. While Kerala begins the weaning much earlier than the other two states, i.e., as early as the third month, in A.P. and U.P. they begin at 6-7 months. Weaning practices showed statistical significance only in Kerala and U.P., but not in A.P. In Kerala infant mortality is somewhat more in early infancy (third month) during weaning time and in the other two states it is much later at 6 to 7 months. Poor hygiene associated with the weaning practices may be responsible for this trend. No doubt early weaning is good for the health of the baby but infection has to be avoided.

While over fifty percent of mothers in Kerala (59.3%) give colostrum during the first two days after birth, only a quarter of mothers in A.P. (25.7%) and only one fifth of them in U.P. (21.7%) do so. This practice may significantly contribute to the low infant mortality in Kerala as against that of A.P. and U.P.

Implications : (i) Existing disparity in nutritional status across different states and among members within a family may have to be reduced for the balanced growth of all the persons in a society. This factor may be taken into account by the policy makers, administrators and heads of the families. Themes on nutrition education also may be imparted accordingly.

(ii) Since balanced meals are not common in U.P. and A.P., among the poor people, certain nutritious foods may be marketed in rural areas all over India on a subsidised basis among them. Coupled with this scheme, provision may be made for nutrition education in choosing the locally available foods to give a balanced diet, for preparing foods without loss of nutrients and for proper weaning practices.

(iii) Since nutrient deficiencies are seen to a greater extent among the pre-school children in U.P. and A.P., they may be provided with nutritious mid-day meal programmes or other forms of supplementary feeding schemes in selected and needy areas for vulnerable children. Discrimination shown to girls in feeding at home may be exposed through mass education.

(iv) Nutritional deficiency and problems during pregnancy may be the cause of low birth weight. Therefore, regular and periodic medical check-up may be arranged for pregnant mothers by the paramedical staff and at the nearest hospital. Added to this, provision may be made, as seen in Kerala, to give nutritious supplementary food to pregnant mothers through the Anganwadi programme or mid-day meal programme.

(v) To control diarrhoeal diseases, improvement in environmental sanitation and supply of safe drinking water to infants may have to be assured. In addition to these, rigorous health education to all concerned may be given so as to make them give only boiled and cooled water to babies as has been done recently all over China and traditionally practised in Kerala (Cuminseed water).

(vi) Suitable programmes like prolonged breastfeeding may be promoted to raise the immunity level of babies. In this context mass immunization programme may be taken upon a regular basis. A school health programme is equally important in this regard.

Differential Influence of Life Affecting Variables

Priority in Policy

For identifying the appropriate and important variables, that affect the health and death of infants, initially 34 major variables were examined to assess the correlation coefficients and regression co-efficients. Out of these variables 11 were retained based on their high degree of correlation co-efficients. They were later on considered for path analysis. Among the eleven variables the following six factors emerged as the most important ones in different order across these states and the rest were found important only in one or two states and not statistically significant. The order of importance of major determinants of mortality are: (1) delivery attendant; (2) education of wife; (3) birth interval; (4) immunization; (5) weight of the infant and (6) house sanitation in the order given above. Some of them showed a direct effect and others revealed an indirect effect or both on mortality. The order of importance of direct/indirect effect of major factors in the three states also varied. In addition to these six variables, five more factors, viz., drinking water supply, fasting, duration of breastfeeding, duration of married life and age at first birth also showed a certain influence on mortality either directly or indirectly. The direction of causal relationships and their order of importance in the nature of causation are given in the path analysis. Thus, a combination of cultural, social, demographic, nutritional factors, sanitation and programme variables together and differentially influence the existing variations in infant mortality across the states of U.P., A.P., Kerala and India as a whole.

Demographic Transition in the Indian States

Across the Indian continent different levels of demographic transitions are observed, when we examine the demographic profile of Kerala in the extreme south, Andhra Pradesh in the south central and Uttar Pradesh in the extreme northern regions of India. These three regions/states manifest differential levels of demographic and different development profiles suitable for explaining the early, subsequent and late phases of demographic transition in a same country. Demographically speaking, U.P. has the highest birth rate of 34.5, IMR of 117 and CDR of 15.7; A.P., on the other hand, has a CBR of 31.8, IMR of 32 and CDR of 10.4. Kerala presents an extreme low birth rate of 26.8, followed by an IMR of 32 and CDR of 6.7. In the field of social development, Kerala is at the top followed by A.P. and lastly by U.P. But the economic development *per se* is highest in A.P. followed by Kerala while U.P. has the lowest position. Where the health facility and delivery systems are concerned, again Kerala ranks first, followed by A.P. and then U.P. The other aspects of social development, viz., education, age at marriage and modernization show a similar trend across these three states. Hence, the preceding demographic and socio-economic development manifest very high inter-relationship in all the three states. In other words, poor socio-economic development and high fertility and mortality are co-existing in U.P. In Kerala the lowest levels of birth rate and death rate are seen along with the highest level of social development; A.P., on the other hand, has an intermediate level of vital events with exceptionally good economic status, which is unusual. The demographic and developmental profile of U.P., by and large, demonstrates the characteristics of an early stage of demographic transition of high fertility and high mortality with low development. But Kerala shows a very high level of social development followed by a very low level of vital events, which is typical of the last phase of demographic transition. A.P. is somewhere in between the beginning and the last phases of demographic transition.

Fertility and Mortality in U.P, A.P. and Kerala

Vital events		U.P.	A.P.	Kerala
Rates CBR	(1983-84)	34.5	31.8	26.8
IMR	(1983-84)	117	85	32
CDR	(SRS*, 1983)	15.7	10.4	6.7

* Source: Registrar-General of India, 1986, SRS for 1983, New Delhi.

The findings discussed in several precedings chapters specifically support the generalisations discussed above. The determinants of low fertility and low mortality in Kerala are largely due to: better health facilities, extensive education among men and women, widespread modernization, higher age at marriage, better transport and communication facilities and several aspects of socio-economic changes (see chapter on Path Analysis). In U.P., however, very poor socio-economic status is extensively noticed. Health facilities and their utilisation are very poor among the people. Literacy level and age at marriage are very low and transport and communication facilities are equally bad. All other aspects of socio-economic development are at a very low level (see chapter on Path Analysis). On all these fronts, except economic status, A.P. stands in between U.P. and Kerala, and so also in demographic transition. Thus, developmental and demographic scenario of different Indian States depicts the on-going different phases of demographic transition.

PART-III

INTERACTION BETWEEN FERTILITY AND MORTALITY

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Interaction Between Fertility and Mortality

–K. Mahadevan & R. Jayasree

This section focusses attention on the interrelationship between fertility and mortality. It is assumed that the desire for extra children increases with the increase in infant mortality for one reason or the other. It may be for "compensating the loss of babies" of for "insuring the survival of an optimum number of children" or for the "replacement effect" of the babies lost and so on. For understanding this relationship empirically, each one of these concepts has been cross-tabulated with the experiences of mortality and fertility (live births). In an earlier section under completed fertility these factors have shown a very high correlation with high fertility. They are once again discussed here with all the respondents to reconfirm the influence of various effects of mortality on general fertility behaviour. In addition to these factors, perception of infant mortality in general, unwanted babies born, and the interaction between fertility and mortality have been highlighted.

Perception of Infant Mortality in General

When asked whether the occurrence of infant mortality is as high nowadays as in the past, as overwhelming percentage of women in A.P. (91.5%) and in Kerala (96.4%) answered negatively as against only 59 percent of the women in U.P. In other words, 38.5% percent of the respondents in U.P. continue to perceive the high incidence of infant mortality as against only 7.9 percent of women in A.P. and only 2.5 percent of women in Kerala. At the aggregate level 23.7 percent of women still perceive and perhaps later also experience the high incidence of infant mortality. The findings reflect the gravity of the problem in U.P. where infant mortality continues to be very high even today. Though infant mortality has declined steeply in U.P., during the last one decade, many people continue to feel that it is a major menace. Therefore, health education coupled with appropriate interventions to reduce mortality rapidly and extensively, in U.P. and other high mortality states is urgently required.

Table 21 : *Perception of Incidence of Infant Mortality in U.P., A.P., Kerala and India (Pooled)*

Perception of mortality	U.P.	A.P.	Kerala	India
Don't know	2.2	0.6	1.1	1.6 (36)
More mortality	7.4	3.6	-	5.1 (117)
Moderate mortality	31.1	4.3	2.5	18.6 (426)
Less mortality	59.3	91.5	96.4	74.7 (1708)

Compensation Effect

To a question "should a couple go in for any additional child/children for the sake of compensating the probable loss of babies during infancy", very interesting responses have been obtained which confirmed the above hypothesis. When the data on experiences of infant mortality, viz., no mortality, one infant died and two and more infants died, is cross-tabulated with the desire of compensating it across the seven districts in three major states, a uniform direct relationship is observed. Hence the hypothesis of compensating by having additional children on accout of infant mortality stands decisively confirmed in this analysis. Women who had experienced infant mortality wanted to compensate for the loss in all the districts and states at a significant level compared to those women who have not experienced such mortality. Such a trend is consistent and conspicuous in all regions. Therefore, it is certain that loss of babies acts as a pronatalist force through the factor on compensation.

Survival Insurance

In order to ascertain the perception of the respondents as to how far they are particular to have additional babies as an "insurance effect", another question was asked on the following lines. "Certain people try to produce more children than they really want in order to have the required number of children for different reasons. According to you, is it necessary to have more child/children for insuring the survival of a few of them at least?" The analysis confirmed the hypothesis that, when the couple experienced one or more infant deaths significantly more of them wanted to have extra babies, in all the districts and states without any exception. Further, when two and more infants are lost to the parents the trend is still more conspicuous. On the other hand, when people did not perceive the problem of "insurance effect" a reverse trend is uniformly noticed in all areas. In other words, when such perception does not exist, more couples did not desire additional babies. Therefore it is fairly certain that existence of "insurance effect" leads to high fertility but it varies differently across the districts and states. A very high percent of women in U.P. (73.8%) perceive it as against much less in Kerala (45.5%) and in the A.P. (32.4%) states and its effect is more widespread in the former state than in the latter two (table not given).

Replacement Effect

The influence of replacement effect is found to be extensive among women of U.P. (91.7%) much less in Kerala (34.7%) and somewhat less in A.P. (27.1%). However, significantly more women who experienced infant mortality wanted to have extra babies to replace the babies died with additional ones in all the three states. Not much difference is noticed in this regard for the women who lost one baby as against two or more infants, which is important exclusively in the case of Andhra Pradesh. With regard to U.P. and Kerala the "Replacement effect" showed a similar trend as in the case of "Compensation effect" and "Survival Insurance"; for India, in general, a similar trend is noticed. For those who did not agree with the perception of "Replacement effect" an inverse relationship is noticed in most of the districts, states with a slight inconsistency exclusively seen in A.P. Thus, it may be concluded that more or less all the three effects of mortality, viz., compensation effect, survival insurance effect and also replacement effect act as pronatalist forces in most of the areas in India. Therefore the existence of higher incidence of infant mortality is a major determinant of high fertility. Hence a rapid reduction of fertility in future may be possible only when we educate couples about the continuing decline of mortality and also control of the high incidence of infant mortality wherever it exists (table not given).

Relative Importance of Mortality Factor

When asked to list all the major reasons for giving birth to more children, the women who have already got three and more live births reported a few reasons. They are: fear of infant mortality; old age security; strength for the family; blessings of God and certain unspecified reasons. Fear of infant mortality is one of the most important and extensively reported reasons and is cited by 59.8 percent of women in U.P., 27.2 percent in Kerala and 17.4 percent in A.P. This additional information further explains the importance of infant mortality as another determinant of high fertility for the women, who experienced this problem as a major one. No doubt, the influence of this factor may be changing over years during the entire duration of the reproductive period and it siginificantly varies across the three states (Table not given).

Influence of Mortality on Fertility

When a baby dies it is assumed that the next baby would be born sooner than it normally happens. This hypothesis has been fully confirmed without any exception in the table given below. It is also expected that women who experienced mortality may have shorter birth intervals and manifest high fertility. This has also been confirmed accordingly in all the three states and for all the women of different duration of married life. Women who had a baby very quickly after the death of a baby, manifest highest fertility of 5.8 in U.P., 5.3 in A.P. and 5.5 in Kerala and 5.6 at the aggregate level. This is an interesting finding which unusually reveals negligible interstate variation in fertility, when the couple experienced mortality. However, when the birth interval increases between the baby born and baby died by two years or even more, interstate variations in fertility becomes more pronounced, which can be seen from the tables 21.5 & 21.6 (given at the appendix).

When a baby died, significantly high proportion of women in

U.P. (45 %), A.P. (49 %) and Kerala (34 %) got the next baby within an year. Another 32 percent, 27 percent and 40 percent of women in these states got their next baby within one to two years. And the remaining 22 percent, 24 percent and 26 percent of women got their subsequent babies only after the completion of two and more years. This trend reveals significant inter-state variations in fertility on this issue because greater proportion of women in U.P. and A.P. got their subsequent babies within the shortest period of one year after the death of a baby as against only one-third of the women in Kerala state. These trends are consistently seen for the young, middle aged and older women in all the states.

Table 21.4: *Percent Distribution of Respondents and Mean Live Births by Duration between Baby Died and Next Baby Born in U.P., A.P., Kerala and India*

	U.P.		A.P.		Kerala		India	
Duration between baby died and next baby born	Per-cent	Mean	Per-cent	Mean	Per-cent	Mean	Per-cent	Mean
≤ 1 year	45.2	5.8	48.6	5.3	33.9	5.5	44.4 (818)	5.6 (818)
1 - 2 years	32.3	5.7	27.0	4.9	40.2	4.9	31.8 (587)	5.3 (587)
2 + years	22.5	5.4	24.4	4.8	25.9	5.0	23.8 (439)	5.1 (439)

Mortality and Maximum Expected Family Size Norm

When the past infant mortality experience is cross-tabulated with the young, middle-aged and older couples in the three states and also with the maximum expected family size norm a significant and consistant relationship is observed everywhere. Fertility increased or was likely to increase for all the age groups and also in all the three states, when the couple experienced one or more infant deaths. Maximum expected number of children is a better indicator for predicting the influence of mortality on fertility than live births because the influence of mortality not only affects the past fertility but would also influence it in the near future. It is the first time that this factor has been studied in this context. The relationship between infant mortality and maximum expected family size norm is more conspicuous for the older women than the young, who are yet to experience mortality. It is also widespread in U.P., followed by A.P. It is the lowest in the case of Kerala. Thus, it is fairly certain that the incidence of infant mortality acts as a major pronatalist force for the present as well as for future fertility (see Table 21.7 at the appendix).

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Unwanted Living Babies

– K. Mahadevan & R. Jayasree

As a result of the past perception of existence of infant mortality, parents naturally resorted to having additional number of children to avoid the risk of losing an optimum number of them. In this process it is possible that some of the extra children that are born may not die and they may become unwanted babies. Because of the delicacy and sentimental factors involved parents also may not reveal the exact number of unwanted babies born to them. It may be the reason that 17.5 percent of the women in Kerala and 0.8 percent of women in A.P. and nil in U.P. were uncertain whether to specify the number of unwanted babies that they have now. In all likelihood these women also would feel the pinch of unwanted babies but do not reveal it explicitly for one reason or the other. However, it is interesting to note that the present data show a reasonably accurate situation and interesting differential findings on the number of unwanted babies felt by the mothers. No doubt the exact number of current unwanted infants may be more but definitely not less.

According to the number of children that the parents have and their perception of unwanted living babies, it is observed that a tenth of the mothers uniformly in all the three states felt that they have got at least one unwanted child now. However, mothers expressing the existence of two unwanted babies are more in Kerala and A.P. than in U.P. state. The same trend continues on the availability of three and more unwanted offsprings; it is as high as 9.2 percent in A.P. followed by 5.7 percent in Kerala and only 4.5 percent in U.P. At the aggregate level 6.1 percent of the women felt that they have three or more unwanted babies.

Taking together one or more unwanted children across different states, it is interesting to note that in U.P. (22.8%) and A.P. (29.8%) slightly more than one fifth of the respondents felt that they have unwanted babies as against significantly more women in Kerala (31.4%). More women in Kerala admitted the existence of unwanted babies because they have definite small family size norm with the successful impact of population education during the recent past, and also because women in Kerala and A.P. are educated and modern compared to U.P. state. At the aggregate level 26.2 percent of the women felt that they have one or more unwanted babies now. These unwanted babies could have been avoided to a great extent if the risk of infant mortality was checked in the past. Of course a few of them might have also been born for other reasons, e.g., the pressure of relatives or husbands besides the economic difficulty faced by them now. The same problem may continue for the future also if the major problem, i.e., the infant mortality is not tackled on a warfooting. The preceding findings further confirm that infant mortality influences high fertility.

Table 22: *Percent Distribution of Infant Deaths by Unwanted Babies born in U.P., A.P., Kerala and India (Pooled)*

	U.P.	A.P.	Kerala	India
Not applicable	40.0	1.2	-	22.2 (507)
No unwanted baby	37.2	68.2	51.1	48.5 (1110)
1 Child	10.5	11.2	12.6	11.0 (252)
2 children	7.8	9.4	13.1	9.1 (209)
3+ children	4.5	9.2	5.7	6.1 (139)
Uncertain	–	0.8	17.5	3.1 (70)
Total unwanted babies	22.8	29.8	31.4	26.2

Table 22.1: *Mean Live Births by Unwanted Babies born in the Process of Getting Extra Children in U.P., A.P., Kerala and India (pooled)*

	U.P.	A.P.	Kerala	India
No unwanted baby born	3.9	3.3	2.7	3.2 (5750)
1 child	5.6	4.7	4.7	5.2 (324)
2 + children	7.0	6.6	6.2	6.7 (358)
Uncertain	-	5.6	6.5	6.3 (68)

Fertility and Unwanted Babies

Women who have got 5.6 live births in U.P., 4.7 in A.P. and again 4.7 births and above in Kerala respectively and at the aggregate level 5.2 percent births and more have reported the presence of one or more unwanted babies. On the other hand, women with 3.9, 3.3, and 2.7 live births in U.P., A.P. and Kerala respectively and 3.2 live births at the aggregate level did not express that they have unwanted babies. When the number of live births increased beyond what is really desired by the women, the number of unwanted babies also increased accordingly. For example, women having 7, 6.6 and 6.2 live births respectively in U.P., A.P. and Kerala states and 6.7 at the aggregate level have admitted having 2 and more unwanted babies. Thus, it is certain that unwanted babies are felt by and large by the mothers who have four or more children in U.P., three or more children in A.P. and 2.5 children and above in Kerala (see Table 22.1).

Thus, women who have experienced infant mortality by and large proceed to have a certain number of extra children for one reason or the other. The number of extra children desired upon the number of infants and children who died. It may be for the sake of replacing the deceased baby or for compensating the probable loss or as an insurance of the loss of babies. In addition to these factors, for avoiding the risk of old age security, and because of the value of children, besides the differential family size norms prevailing in many regions of the country, parents go in for extra babies. The effect of mortality on high fertility also operates even when only the perception of infant mortality prevails. During the process of having extra babies for fear of infant mortality, certain differential unwanted babies are also born across these states; they are more in U.P. than in the other two states. In comparison with the other factors of fertility, the influence of infant mortality is one of the major factors reported in all the three states. Further, when infant mortality occurs, the subsequent baby is born mostly at short intervals of time in all the places. These findings have very great policy relevance to strengthen the survival chances and development of babies to avoid the birth of unwanted children and consequently high fertility in future, besides facilitating the increase in the inter-birth interval for the health of the baby and the mother alike.

Certain Determinants of Unwanted Babies

Since the babies considered as unwanted by the parents in all the three states are substantial in number, it was decided to examine this problem further to identify the factors that might be contributing to such a feeling among the mothers in general. The probable factors considered in this context are: the number of living children of parents and among them which child, male or female is more unwanted; the number of babies that died and the extent of the contribution of childhood mortality to the formation of unwanted babies; caste and religion, economic status, education of mothers, and family planning behaviour. It is hypothesised that some of these factors might contribute to the present differential feelings about the existence of unwanted children among parents. These ideas may be helpful in motivating the high parity couples to accept family planning and also to make the emerging eligible couples to limit the future size of their family. It has several implications in the context of existing law and development of children in big families.

The range of unwanted babies for members with two to seven or more living children was 1-2.5 in U.P., 1.5-2.4 in A.P. and 1.6-2.6 in Kerala, besides 1.4-2.4 at the aggregate level. These ranges, however, do not differ widely across these states. It is obvious that women in these states already have got more living children, then they really want. Further they would have had a certain number of unwanted babies in the process of avoiding the mortality risk and subsequently such a risk would not have happened resulting in unwanted babies. No doubt in the past when contraceptives were not widely made available and used, people would have had extra baby/babies by accidental pregnancies also.

The number of living children has a direct relationship with the number of unwanted babies in all the three states, irrespective of sex preference (see Table 22.2). While women with 2 or less living children and admitting of having unwanted babies are least in U.P. and Kerala, they are, of course, more in A.P. Similarly the number of women who have now five or more living children and admitting the existence of certain number of unwanted babies again is significantly high in A.P. (68 cases) followed by U.P. (51 cases) and Kerala (18 cases). It is surprising that U.P. mothers like their high fertility sisters in A.P., do not similarly feel the pinch of unwanted babies. In fact more of them should have spoken of it than the A.P. mothers in view of their higher fertility. In all the states a higher proportion of women with completed fertility ($\geq$ 35) and having a considerable number of living children expressed the feeling that they had one or more unwanted children as against relatively young women aged 35 years or less.

Considering the sex-wise variations in unwanted babies, of the living ones, not much difference is noticed up to three living children in U.P. and A.P. and up to four babies in Kerala though the number of cases is less in the latter state. When the number of living children exceeds three or four babies, daughters are more felt as unwanted than boys in all the states. The findings thus fairly confirm that with one daughter, most women do not feel that she is unwanted, but such a feeling develops with two or more daughters. In the case of sons also, such feelings are no doubt there in a certain category of mothers but such a trend is seen among fewer mothers in A.P. than in U.P. An inconsistent trend is seen in Kerala perhaps because of the legacy of matriliny and greater social change seen in Kerala.

Mortality and Unwanted Babies

Considering the formation of unwanted babies over a period of time it has been confirmed that significantly more women, who have experienced the death of one or more babies, felt the presence of more unwanted babies than others who did not experience any loss. Of the mothers who admitted to having a certain number of unwanted children, only 32.1 percent of them in U.P. had not lost any baby as against 67.9 percent of mothers in fact had lost one or more babies. Interestingly, more mothers in A.P. and Kerala reported that they have now a certain number of unwanted babies when they had lost one or more. This is because U.P. women have higher fertility and a larger family size norm than women of A.P. and Kerala. This fact may inhibit mothers from confessing that they have unwanted babies. It is evident that in all the states unwanted children are significantly more for older women (aged $\geq$ 35) than for the young mothers because of their differential number of living offsprings. Thus, Table 22.4 fully supports the hypothesis that unwanted babies exists mostly due to the extra babies created, presumably to reduce the risk of infant and childhood mortality. However, failure of lack of contraception and absence of planning, etc., may also add to the number of unwanted babies.

Other Social Characteristics

The religious and caste background of the respondents who admitted to having unwanted babies varies significantly within each state and among the three States. The largest percent of mothers who admitted to having unwanted babies belong to the backward caste in U.P. (30.6%) to the scheduled castes and tribes in A.P. (25.5%) and to Muslim and Christian communities in Kerala (46.1%). In fact they have very high fertility too. On the other hand, the least number of mothers who have admitted to having unwanted babies in these states are the Muslims in U.P. (19%) the B.C. in A.P. (23.2%) and the FC in Kerala (7.8%) except for the FC in Kerala, the Muslims in U.P. and the B.Cs in A.P. have very high fertility. Hence it is evident that many high fertility groups in these states have not yet realised that they have unwanted babies. At the aggregate level more BC (28.7%) and less FC (19.9%) have reported that they have different proportions of these babies, and this is in line with their respective level of fertility behaviour. Age-wise variations show that in U.P., a slightly higher percent of the older women than the younger mothers, except among the Muslims and BC groups, felt they had unwanted babies. But in A.P., slightly more young women in most of the communities except the FC admitted the existence of such babies. In Kerala, in most of the communities except among the Muslims, more older women felt the same. Thus, uniformly, young Muslims in all the three states agreed that they have unwanted children. This may be due to the impact of family planning and the education of these women. The concept of unwanted offsprings can be made use of for the effective motivation of young couples and groups in the community who are resisting family planning. Care must also be taken to prevent neglect of the existing unwanted babies by their parents (Table not given).

The education level of the mothers in U.P., A.P., Kerala and at the all-India level showed a definite inverse relationship with the reported unwanted children. However, the age of the mother contributes a new dimension to this finding. When this factor is controlled, the above mentioned inverse relationship emerges only among women of completed fertility ($\geq$ 35) in all the states, but a direct relationship is observed with the education of young mothers ($\geq$ 35 years). These various types of relationship that has been noticed regarding unwanted babies among the young and old mothers with differential educational background may be due to several reasons. The young mothers are likely to be more educated and hence the present relationship may emerge accordingly. On the other hand, old mothers would be by and large less educated illiterate and may experience the pinch of their present high fertility and poverty (Table not given).

The economic status of the family also has influenced the mothers in all the places to admit that they have unwanted babies. Most of the women who admitted to the presence of unwanted babies in their families belonged to the poor income group with an annual income of Rs. 9,000 or less. They constitute 72.3 percent in U.P., 60.7 percent in A.P., 61.5 percent in Kerala and 66.8 percent at the aggregate level. Only the remaining mothers with higher income levels admitted to having unwanted babies in their families. Therefore, the existing financial strain may be a major factor which makes mothers consider a certain number of their children as unwanted, which is independent of all other factors (Table not given). The age of the mother does not affect the above findings in all the states.

Availability of child labour has an inverse relationship with the reported number of unwanted children for the mothers in all the

Table 22.6: *Percent Distribution of Mothers on Unwanted Babies by their Age, Adoption of Family Planning in U.P., A.P., Kerala and India*

Family Planning adopting	U.P.			A.P.			Kerala			India		
	34 Yrs	35+ yrs	Total	≤34 yrs	35+ yrs	Total	≤34 yrs	35+ yrs	Total	≤34 yrs	35+ yrs	Total
Non adopters	53.6 (111)	46.4 (96)	60.3 (207)	63.2 (60)	36.8 (35)	45.0 (95)	43.6 (17)	56.4 (22)	30.5 (39)	55.1 (188)	44.9 (153)	50.0 (341)
adopters	41.9 (57)	58.1 (79)	39.7 (136)	44.8 (52)	55.2 (64)	55.0 (116)	40.4 (36)	59.6 (53)	69.5 (89)	42.5 (145)	57.5 (196)	50.0 (341)

states and at the aggregate level. The same finding is more or less there for the young mothers but with certain minor inconsistencies because of the sample size. But for older women a direct relationship is fairly seen in U.P., and A.P, but not in Kerala. Young women may gain from the wages of child labour with a relatively small family size. Thus, the concept of child labour to a certain extent reduces the burden of unwanted babies and makes parents in all areas consider unwanted babies as an economic asset to a certain extent (see Table 22.5 at the appendix). Hence there is a possibility that is child labour is abruptly stopped, many more mothers might consider a few of the living children as unwanted and resort to contraception.

Unwanted Children and Parental Contraception

How the existence of unwanted child/children affects the contraceptive behaviour of mothers is an equally interesting question. Despite the higher existence of unwanted babies reported by mothers in U.P. (60.3%), they have not adopted contraception. But in A.P. (55%) and Kerala (69.5%) a greater proportion of mothers have adopted contraception, when they realised that they have one or more unwanted babies. The influence of unwanted babies on contraception is significantly more in Kerala than in A.P. It is a wonder why in U.P. mothers do not accept contraception in spite of knowing very well that they have a big family and that some of their children are also unwanted. When the age of the mother was controlled more older women adopted contraception in all the states and at the aggregate level. On the other hand more young women unsurprisingly have not adopted contraception in spite of having unwanted child/children in all the areas. The U.P. findings suggest the need for a special study among high party couples on the reasons for their reluctance to accept family planning (Table 22.6).

APPENDIX

Table 1.4(a): *Number of Mean Living Children by Respondents' Age in U.P., A.P., Kerala and India*

Age categories	U.P.	A.P.	Kerala	Total
19 years	1.1 (87)	1.3 (123)	1.0 (37)	1.2 (337)
20-24 years	1.7 (406)	2.2 (449)	1.5 (412)	1.8 (1267)
25-29 years	2.9 (498)	2.9 (497)	2.2 (749)	2.6 (1744)
30-34 years	3.9 (395)	3.4 (358)	2.8 (517)	3.3 (1270)
35-39 years	4.4 (375)	3.9 (280)	3.5 (432)	3.9 (1087)
40-44 years	4.9 (224)	4.0 (154)	4.1 (296)	4.3 (674)
45 +	4.7 (15)	4.1 (49)	4.1 (57)	4.2 (121)
Total	2000	2000	2500	6500

Table 1.4 (b): *Mean Live Births According to Duration of Marriage of Mother and Age at Marriage of Husband in U.P., A.P., Kerala and India.*

Age at marriage of husbands	U.P.				A.P.				Kerala				India			
	≤ 10 years	11-20	21+	Total	≤ 10 years	11-20	21+	Total	≤ 10 years	11-20	21+	Total	≤ 10 years	11-20	21+	Total
≤14 years	2.2 (140)	4.9 (210)	6.5 (158)	4.6 (508)	1.6 (8)	3.8 (16)	5.9 (16)	4.2 (40)	-	2.5 (2)	-	2.5 (2)	2.2 (148)	4.8 (228)	6.4 (174)	4.6 (550)
15-19 years	2.2 (378)	4.7 (471)	6.5 (247)	4.3 (1096)	2.1 (269)	4.0 (267)	5.4 (147)	3.6 (683)	2.2 (18)	4.1 (22)	4.5 (15)	3.6 (55)	2.2 (665)	4.4 (760)	6.0 (409)	4.0 (1834)
20-24 years	2.0 (147)	4.7 (114)	6.0 (73)	3.8 (334)	2.1 (352)	3.9 (456)	5.2 (233)	3.6 (1041)	2.1 (417)	3.6 (343)	5.0 (158)	3.2 (918)	2.1 (916)	3.9 (913)	5.2 (464)	3.4 (2293)
25-29 years	2.5 (20)	4.5 (15)	5.6 (10)	3.8 (45)	2.0 (67)	3.6 (74)	4.8 (52)	3.4 (193)	1.9 (610)	3.4 (353)	5.0 (149)	2.8 (1112)	1.9 (697)	3.5 (442)	5.0 (211)	2.9 (1350)
30-34 years	2.3 (4)	4.0 (2)	7.3 (3)	4.3 (9)	2.2 (14)	3.3 (13)	3.7 (3)	2.8 (30)	1.8 (186)	3.1 (107)	4.6 (35)	2.6 (328)	1.8 (204)	3.1 (122)	4.7 (41)	2.6 (367)
35+ years	1.7 (3)	4.0 (2)	6.7 (3)	4.1 (8)	1.5 (4)	5.4 (5)	6.3 (4)	4.5 (13)	2.0 (44)	3.4 (35)	4.5 (6)	2.8 (85)	1.9 (51)	3.6 (42)	5.6 (13)	3.0 (106)

Table 4.2: *Percent Distribution of Respondents in U.P., A.P., Kerala and India by Educational Status of the Husband and Wife.*

Educational status	U.P.		A.P.		Kerala		India	
	Husband	Wife	Husband	Wife	Husband	Wife	Husband	Wife
Illiterates	41.0	85.6	50.1	69.6	10.1	13.0	31.9 (2074)	52.7 (3428)
Ist to Vth class	19.6	9.6	18.2	16.4	30.0	30.4	22.4 (1455)	19.7 (1280)
VI to VIII class	13.5	3.0	10.8	8.3 20.7	17.8	15.4	10.3 (1003)	(672)
IX to XI class	14.0	1.0	12.6	4.9 29.8	30.9	19.7	13.7 (1278)	(890)
Intermediate and above	11.9	0.8	8.3	0.8 11.4	7.9	10.6	3.6 (690)	(230)

Table 4.2 (a): *Mean Live Births According to the Duration of Marriage of Mother and Education of Wife in U.P., A.P., Kerala and India*

Education of wife	U.P.				A.P.				Kerala				India			
	10 years	11-20	21+	Total	10 years	11-20	21+	Total	10 years	11-20	21+	Total	10 years	11-20	21+	Total
Illiterate	2.2	4.8	6.5	4.4 (1711)	2.1	4.2	5.8	3.8 (1391)	2.3	4.4	5.9	4.2 (326)	2.2	4.5	6.2	4.2 (3428)
1 - 5	2.1	4.5	5.6	3.6 (192)	2.0	3.4	4.1	3.2 (320)	2.1	3.6	5.1	3.3 (759)	2.1	3.7	4.9	3.3 (1280)
6 - 8	2.3	4.4	4.1	3.2 (61)	2.1	2.8	3.4	2.6 (165)	2.0	3.5	5.3	2.9 (446)	2.0	3.4	4.0	2.8 (672)
9 - 11	1.8	5.7	5.0	3.4 (19)	2.0	3.1	3.9	2.6 (99)	1.9	3.0	3.6	2.3 (772)	1.9	3.0	3.7	2.4 (890)
College education (intermediate, graduate + post-graduate)	1.6	4.3	4.0	2.7 (17)	1.6	2.8	-	2.2 (16)	1.6	2.5	2.0	1.8 (197)	1.6	2.7	2.7	1.9 (230)

Table 4.6: *Mean Live Births According to Opportunity Costs in U.P., A.P., Kerala and India*

Dimensions of opportunity costs	U.P.		A.P.		Kerala		India	
	Yes	No	Yes	No	Yes	No	Yes	No
No scope for getting rest	4.5 (1384)	3.7 (616)	3.8 (1058)	3.2 (942)	3.7 (1333)	2.1 (1167)	4.0 (3775)	2.8 (2725)
Not able to enjoy leisure time	4.8 (685)	4.0 (1315)	3.9 (537)	3.4 (1463)	3.8 (932)	2.4 (1568)	4.1 (2154)	3.2 (4346)
No facility to read and acquire knowledge	4.3 (44)	4.3 (1956)	3.0 (15)	3.6 (1985)	2.8 (106)	2.9 (2394)	3.2 (165)	3.6 (6335)
No convenience to taking treatment	4.8 (949)	3.8 (1051)	4.2 (245)	3.5 (1755)	3.7 (1149)	2.2 (1351)	4.2 (2343)	3.2 (4157)
Inadequate time to look after children	4.9 (946)	3.7 (1054)	4.1 (282)	3.5 (1718)	3.7 (1173)	2.2 (1327)	4.2 (2401)	3.1 (4099)
No opportunity for school/ college education	4.5 (47)	4.3 (1953)	4.8 (4)	3.5 (1996)	2.4 (32)	2.9 (2468)	3.7 (83)	3.5 (6417)

Table 6.1: *Per cent Distribution of Family Planning Adoption Status According to Number of Living Children by District in U.P., A.P., Kerala and India.*

Districts	U.P.			A.P.			Kerala			India		
	≤ 2 Adoption*	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption
Jhansi	2.0 (20)	29.6 (292)	31.6 (312)	-	-	-	-	-	-	2.0 (20)	29.6 (292)	31.6 (312)
Gorakhpur	7.1 (69)	22.2 (217)	29.3 (286)	-	-	-	-	-	-	7.1 (69)	22.2 (217)	29.3 (206)
Kurnool	-	-	-	6.1 (62)	30.4 (303)	36.5 (365)	- -	- -	- -	6.1 (62)	30.4 (303)	36.5 (365)
Guntur	-	-	-	26.1 (258)	35.3 (348)	61.4 (606)	-	-	-	26.1 (258)	35.3 (348)	61.4 (606)
Palghat	-	-	-	-	-	-	22.8 (228)	30.6 (306)	53.4 (534)	22.8 (228)	30.6 (306)	53.4 (534)
Trivandrum	-	-	-	-	-	-	32.9 (331)	41.1 (413)	74.0 (744)	32.9 (331)	41.1 (413)	74.0 (744)
Alleppey	-	-	-	-	-	-	35.7 (176)	36.9 (182)	72.6 (358)	35.7 (176)	36.9 (182)	72.6 (358)

* Only Adopters are given in the table.

Table 6.2: *Percent Distribution of Family Planning Status according to Number of Living Children and Religion in U.P., A.P., Kerala and India (Pooled)*

No. of living children	U.P.			A.P.			Kerala			India		
Religion	≤ 2 Adoption	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption
Muslims	3.7 (14)	19.2 (73)	22.9 (87)	4.0 (10)	23.0 (58)	27.0 (68)	18.5 (66)	35.1 (125)	53.6 (191)	9.1 (90)	25.9 (256)	35.0 (346)
Christians	-	-	-	2.9 (4)	37.5 (51)	40.4 (55)	26.1 (153)	39.7 (233)	65.8 (386)	21.7 (157)	39.2 (284)	60.9 (441)
Hindus	4.7 (75)	27.5 (436)	32.2 (511)	19.1 (305)	34.0 (543)	53.1 (848)	33.2 (516)	39.9 (543)	73.1 (1059)	19.0 (896)	32.2 (1522)	51.2 (2418)

$X^2 = 0.11$, $X^2 = 1.3$, X^2 1.1, for 1 d.f., $< P = 0.05$ for U.P., A.P. and Kerala respectively.

Table 6.3: *Percent Distribution of Family Planning Adoption Status According to Number of Living Children by Caste in U.P., A.P., Kerala and India (Pooled)*

Caste groups	U.P.			A.P.			Kerala			India		
	≤ 2 Adoption	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption
Christians/Muslims	3.7 (14)	19.3 (73)	23.0 (87)	3.8 (14)	27.2 (100)	31.0 (114)	21.8 (190)	37.8 (329)	59.6 (519)	13.5 (218)	31.0 (502)	44.5 (720)
SC/ST	3.8 (22)	25.8 (148)	29.6 (170)	3.2 (12)	23.4 (88)	26.6 (100)	33.7 (94)	42.3 (118)	76.0 (212)	10.4 (128)	28.8 (354)	39.3 (482)
BC	5.4 (33)	22.8 (139)	28.2 (172)	8.1 (40)	32.8 (162)	40.9 (202)	27.6 (241)	35.5 (310)	63.1 (551)	22.6 (446)	30.9 (611)	53.5 (1057)
FC	5.0 (20)	36.9 (149)	41.9 (169)	33.9 (253)	40.4 (302)	74.3 (555)	44.2 (210)	30.3 (144)	74.5 (354)	29.7 (483)	36.6 (595)	66.3 (1078)

$X^2 = 15.5$, $X^2 = 70.0$, $X^2 = 61.6$ for 2 d.f., $> P = 0.01$ for U.P., A.P., and Kerala respectively.

Table 6.4: *Percent Distribution of Family Planning Adoption Status According to Number of Living Children by Level of Education of Wife in U.P., A.P., Kerala and India*

Education of wife	U.P.			A.P.			Kerala			India		
	≤ 2 Adoption	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption
Illiterate	4.0 (67)	25.1 (422)	29.1 (489)	8.4 (116)	30.0 (413)	38.4 (529)	11.4 (37)	36.2 (118)	47.6 (155)	6.5 (220)	28.1 (953)	34.6 (1173)
Primary	5.3 (10)	30.5 (58)	35.8 (68)	27.1 (89)	43.2 (142)	70.3 (231)	20.5 (155)	43.9 (333)	64.4 (488)	19.9 (254)	41.7 (533)	61.6 (787)
Secondary	11.4 (9)	31.6 (25)	43.0 (34)	41.2 (108)	36.3 (95)	77.5 (203)	34.8 (424)	34.7 (423)	69.5 (847)	34.7 ((541)	34.8 (543)	69.5 (1084)
Collegiate	23.1 (3)	30.8 (4)	53.8 (7)	37.5 (6)	12.5 (2)	50.0 (8)	60.7 (119)	13.8 (27)	74.5 (146)	56.9 (128)	14.9 (33)	71.6 (161)

Table 6.5: *Percent Distribution of Family Planning Adoption Status according to Number of Living Children by Income in U.P., A.P., Kerala and India*

Family Income	U.P.			A.P.			Kerala			India		
	≤ 2 Adoption	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption	≤ 2 Adoption	3+ Adoption	Total Adoption
5000	3.6 (27)	20.4 (152)	24.0 (179)	13.2 (53)	18.9 (76)	32.0 (129)	29.9 (116)	24.2 (94)	54.1 (210)	10.2 (196)	16.7 (322)	26.9 (518)
5001-9000	4.2 (33)	26.6 (209)	30.8 (242)	15.4 (125)	32.3 (262)	47.7 (387)	24.7 (252)	38.6 (394)	63.3 (646)	15.7 (410)	33.0 (865)	48.7 (1275)
9001-13000	3.5 (9)	32.4 (83)	35.9 (92)	18.0 (68)	36.0 (136)	54.0 (204)	30.0 (159)	40.8 (216)	70.8 (375)	20.3 (236)	37.4 (435)	57.6 (671)
13001-17000	9.9 (8)	32.1 (26)	42.0 (34)	18.5 (31)	43.5 (73)	61.9 (104)	30.3 (80)	39.8 (106)	70.1 (185)	23.2 (119)	39.8 (204)	63.0 (323)
17001-21000	13.6 (6)	29.5 (13)	43.1 (19)	16.7 (14)	42.9 (36)	59.6 (50)	40.8 (60)	32.0 (47)	72.8 (107)	29.1 (80)	34.9 (96)	64.0 (176)
21001+	7.5 (4)	49.1 (26)	56.6 (30)	19.9 (28)	48.9 (69)	68.8 (97)	45.9 (68)	30.4 (45)	76.4 (113)	29.2 (100)	40.9 (140)	70.2 (240)

Table 6.9: *Percent Distribution of Family Planning Adoption Status According to the Opportunity Cost Score, Number of Living Children in U.P., A.P., Kerala and India*

Opportunity cost index	U.P.			A.P.			Kerala			India		
	≤ 2	3+	Total	≤ 2	3+	Total	≤ 2	3+	Total	≤ 2	3+	Total
Low (6-7 score)	8.6 (51)	15.7 (93)	24.3 (144)	19.7 (241)	32.5 (399)	52.2 (640)	39.2 (474)	16.9 (205)	56.2 (679)	25.8 (766)	23.5 (697)	49.3 (1463)
Medium (8-9 score)	2.2 (24)	28.7 (325)	30.9 (349)	10.4 (78)	32.6 (248)	43.0 (326)	21.0 (139)	47.7 (318)	68.7 (457)	8.1 (241)	35.1 (891)	43.2 (1132)
High (10-12 score)	5.3 (14)	33.2 (91)	38.3 (105)	-	45.5 (5)	45.4 (5)	17.2 (122)	53.4 (378)	70.6 (500)	13.7 (136)	47.6 (474)	61.3 (610)

Table 7.3: *Mean Live Births Among Women Aged 35 Years and Above According to Religion and Education of Wife in U.P., A.P., Kerala and India*

Educational level	U.P.				A.P.				Kerala				India			
	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total
Illiterate	6.5	-	6.3	6.3 (563)	6.9	6.4	5.5	5.8 (324)	6.2	5.8	4.9	5.4 (158)	6.5	6.1	5.9	6.0 (1045)
1-5 class	6.4	-	5.5	5.7 (38)	6.0	5.0	3.9	4.1 (107)	6.3	4.6	4.1	4.6 (284)	6.3	4.6	4.2	4.6 (429)
6-8 class	-	-	4.4	4.4 (7)	-	5.0	3.2	3.2 (41)	3.8	4.2	3.8	3.9 (134)	3.8	4.2	3.7	3.8 (182)
9-11 class	-	-	6.0	6.0 (2)	-	4.2	3.1	3.4 (19)	2.6	3.0	3.2	3.1 (181)	2.6	3.1	3.2	3.2 (202)
Intermediate +	-	-	4.0	4.0 (1)	-	-	3.5	3.5 (2)	3.0	2.3	2.4	2.4 (41)	3.0	2.3	2.5	2.5 (44)

Table 7.4: *Mean Live Births Among Women Aged 35 Years and Above According to Religion and Replacement Effect in U.P., A.P., Kerala and India*

Replacement effect	U.P.				A.P.				Kerala				India			
	Muslims	Christians	Hindus	Total	Muslims	Christians	Hindus	Total	Muslims	Christians	Hindus	Total	Muslims	Christians	Hindus	Total
Yes	6.6	-	6.4	6.4 (548)	7.9	6.4	6.3	6.6 (103)	6.6	5.9	4.7	5.6 (135)	6.8	6.0	6.2	6.3 (786)
No	3.8	-	4.9	4.8 (63)	6.2	5.8	4.4	4.7 (390)	5.1	3.8	3.7	3.9 (663)	5.4	4.1	4.1	4.2 (1116)

Table 7.5: *Mean Live Births Among Women Aged 35 Years and Above According to Relition and Survival Insurance in U.P., A.P., Kerala and India.*

Survival insurance	U.P.				A.P.				Kerala				India			
	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total
Yes	6.6	-	6.3	6.3 (443)	8.0	6.3	6.3	6.7 (111)	6.8	5.9	5.3	5.8 (185)	6.9	6.0	6.1	6.2 (739)
No	6.0	-	5.9	6.0 (168)	6.1	5.7	4.4	4.6 (382)	4.5	3.7	3.5	3.7 (613)	5.3	4.0	4.2	4.3 (1163)

Table 7.6: *Mean Live Births Among Women Aged 35 Years and Above According to Religion and Number of Babies Died in U.P., A.P., Kerala and India*

Number of babies died	U.P.				A.P.				Kerala				India			
	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total
No baby died	5.5	-	4.8	4.9 (173)	6.0	4.1	3.5	3.6 (573)	4.9	3.4	3.4	3.5 (573)	5.2	3.4	3.7	3.8 (960)
1 baby died	6.4	-	5.7	5.8 (165)	6.3	6.6	4.9	5.2 (140)	6.6	5.4	4.8	5.3 (148)	6.4	5.6	5.2	5.5 (453)
2 babies died	7.7	-	6.6	6.8 (107)	7.5	6.2	6.5	6.6 (67)	8.4	6.4	6.0	6.4 (48)	7.8	6.3	6.5	6.7 (222)
3 babies died	7.6	-	7.2	7.2 (82)	7.6	7.3	7.0	7.1 (33)	8.0	5.4	7.0	6.7 (17)	7.7	6.1	7.1	7.1 (132)
4+ babies died	8.5	-	8.1	8.1 (84)	8.3	8.0	8.1	8.2 (39)	8.0	8.2	7.3	7.8 (12)	8.3	8.1	8.1	8.1 (135)

Table 7.5: *Mean Live Births Among Women Aged 35 Years and Above According to Relition and Survival Insurance in U.P., A.P., Kerala and India.*

Survival insurance	U.P.				A.P.				Kerala				India			
	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total
Yes	6.6	-	6.3	6.3 (443)	8.0	6.3	6.3	6.7 (111)	6.8	5.9	5.3	5.8 (185)	6.9	6.0	6.1	6.2 (739)
No	6.0	-	5.9	6.0 (168)	6.1	5.7	4.4	4.6 (382)	4.5	3.7	3.5	3.7 (613)	5.3	4.0	4.2	4.3 (1163)

Table 7.6: *Mean Live Births Among Women Aged 35 Years and Above According to Religion and Number of Babies Died in U.P., A.P., Kerala and India*

Number of babies died	U.P.				A.P.				Kerala				India			
	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total
No baby died	5.5	-	4.8	4.9 (173)	6.0	4.1	3.5	3.6 (573)	4.9	3.4	3.4	3.5 (573)	5.2	3.4	3.7	3.8 (960)
1 baby died	6.4	-	5.7	5.8 (165)	6.3	6.6	4.9	5.2 (140)	6.6	5.4	4.8	5.3 (148)	6.4	5.6	5.2	5.5 (453)
2 babies died	7.7	-	6.6	6.8 (107)	7.5	6.2	6.5	6.6 (67)	8.4	6.4	6.0	6.4 (48)	7.8	6.3	6.5	6.7 (222)
3 babies died	7.6	-	7.2	7.2 (82)	7.6	7.3	7.0	7.1 (33)	8.0	5.4	7.0	6.7 (17)	7.7	6.1	7.1	7.1 (132)
4+ babies died	8.5	-	8.1	8.1 (84)	8.3	8.0	8.1	8.2 (39)	8.0	8.2	7.3	7.8 (12)	8.3	8.1	8.1	8.1 (135)

Table 7.7: *Mean Live Births Among Woman Aged 35 Years and Above According to Religion and Adoption Status of Family Planning in U.P., A.P., Kerala and India*

Adoption status of family planning	U.P.				A.P.				Kerala				India			
	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total	Muslims	Xians	Hindus	Total
Non-adopters	6.3	-	6.4	6.3 (342)	7.1	6.1	5.7	6.0 (180)	6.6	4.6	4.4	4.9 (217)	3.8	5.0	5.8	5.3 (739)
Tubectomy / Vasectomy	7.1	-	5.9	6.1 (238)	6.2	5.8	4.4	4.6 (310)	4.9	4.4	3.6	4.0 (433)	5.9	4.6	4.5	4.7 (981)
Temporary methods	6.0	-	6.4	6.3 (31)	-	-	6.3	6.3 (3)	4.7	3.5	3.7	3.7 (148)	5.0	3.5	4.3	4.2 (182)

Table 7.9: *Percent Distribution of Family Planning Adoption Status according to Number of Living Children and Education of Husband in U.P., A.P., Kerala and India*

Education of husband	U.P.			A.P.			Kerala			India		
	≤ 2 Adop.	3+ Adop.	Total Adop.	≤ 2 Adop.	3+ Adop.	Total Adop.	≤ 2 Adop.	3+ Adop.	Total Adop.	≤ 2 Adop.	3+ Adop.	Total Adop.
Illiterate	3.6 (29)	24.2 (195)	27.8 (224)	8.5 (84)	27.8 (276)	36.3 (360)	11.1 (28)	39.5 (100)	50.6 (128)	6.9 (141)	27.8 (571)	34.7 (712)
1-5	3.3 (13)	32.4 (126)	35.7 (139)	19.7 (71)	35.7 (129)	55.4 (200)	20.8 (145)	41.0 (286)	61.8 (431)	15.8 (229)	37.4 (541)	53.2 (770)
6-11	4.5 (24)	22.1 (119)	26.6 (143)	26.4 (123)	38.2 (178)	64.6 (301)	33.4 (421)	34.4 (434)	67.8 (855)	25.5 (578)	32.3 (731)	57.4 (1299)
Collegiate	15.9 (37)	29.7 (69)	39.7 (92)	24.8 (41)	41.8 (69)	66.7 (110)	49.3 (141)	28.3 (81)	77.6 (222)	30.6 (205)	32.1 (219)	62.1 (424)

Table 14.4: *Percent Distribution of Respondents in U.P., A.P., Kerala and India by the Source of Drinking Water Supply.*

Source of drinking water	U.P. N=2000	A.P. N=2000	Kerala N=2500	India N=6500
Pond/Tank/Canal	0.05 (1)	14.5 (290)	1.2 (30)	4.9 (321)
Stepped well	2.2 (43)	0.6 (12)	-	0.84 (55)
Unstepped well	42.7 (853)	24.2 (484)	78.8 (1970)	50.6 (3307)
Bore well	45.4 (907)	27.5 (549)	2.1 (52)	23.1 (1508)
Tap water	9.8 (196)	33.2 (665)	17.9 (448)	20.0 (1309)

Table 16.7: *Percent Distribution of Respondents of Three States by Type of Weaning Foods and Age of Children*

State	Age			
	4-8 months	9-12 months	1-2 years	+2 years
I. *Cereals + Pulses*				
U.P.	10.9	21.6	16.7	18.2
	(19)	(65)	(39)	(18)
A.P.	63.4	75.8	81.2	81.8
	(111)	(228)	(190)	(81)
Kerala	25.7	2.7	2.1	-
	(45)	(8)	(5)	
Total	175	301	234	99
II. *Marketed Foods*				
U.P	-	12.0	20.0	50.0
		(3)	(1)	(1)
A.P.	62.5	68.0	60.0	50.0
	(30)	(17)	(3)	(1)
Kerala	37.5	20.0	20.0	-
	(18)	(5)	(1)	
Total	48	25	5	2
III. *Cereals, Pulses, Fruit, Milk and Milk Products*				
U.P.	28.4	50.9	66.9	80.0
	(67)	(251)	(557)	(733)
A.P.	33.5	29.4	22..0	10.2
	(79)	(145)	(183)	(93)
Kerala	38.1	19.7	11.2	9.8
	(90)	(97)	(93)	(90)
Total	236	493	833	916
IV. *Cereals, Pulses, Fruit, Milk, Eggs, Meat, Fish*				
U.P.	-	-	3.3	2.9
			(26)	(46)
A.P.	-	-	33.6	35.6
			(263)	(569)
Kerala	-	-	63.1	61.5
			(494)	(983)
Total	-	-	783	1598

Table 21.5: *Mean Live Births According to Duration of Marriage and Duration between a Baby Died and Next Baby Born in U.P., A.P., Kerala and India.*

Duration between a baby died and next baby born	U.P.				A.P.				Kerala				India			
	10 years	11-20	21+	Total	10 years	11-20	21+	Total	10 years	11-20	21+	Total	10 years	11-20	21+	Total
$\leq$1 year	3.4 (77)	5.6 (185)	7.4 (129)	5.8 (391)	3.2 (50)	5.1 (156)	5.0 (109)	5.3 (315)	3.6 (26)	5.9 (40)	6.3 (46)	5.5 (112)	3.4 (153)	5.4 (381)	6.3 (284)	5.6 (818)
1-2 years	3.1 (47)	5.4 (134)	7.3 (98)	5.7 (279)	3.0 (37)	4.7 (78)	6.2 (60)	4.9 (175)	3.2 (34)	5.1 (51)	6.0 (48)	4.9 (133)	3.1 (118)	5.1 (263)	6.7 (206)	5.3 (587)
2^+ years	2.8 (14)	4.9 (99)	6.4 (81)	5.4 (194)	2.8 (20)	4.1 (74)	6.1 (65)	4.8 (159)	3.2 (11)	4.5 (40)	6.0 (35)	5.0 (86)	2.9 (45)	4.6 (1213)	6.2 (181)	5.1 (439)

Table 21.6: *Percent Distribution of Respondents and Mean Live Births by Duration between Baby Died and Next Baby Born in U.P., A.P., Kerala and India*

Duration between baby died and the next baby born	U.P		A.P.		Kerala		India	
	Percent	Mean	Percent	Mean	Percent	Mean	Percent	Mean
1 year	45.2	5.8	48.6	5.3	33.9	5.5	44.4 (818)	5.6 (818)
1-2 years	32.3	5.7	27.0	4.9	40.2	4.9	31.8 (587)	5.3 (587)
2^+ years	22.5	5.4	24.4	4.8	25.9	5.0	23.8 (439)	5.1 (439)

Table 21.7: *Mean Maximum Number of Children Desired according to Duration of Marriage and Number of Infants Died in U.P., A.P., Kerala and India*

Infant death	U.P.				A.P.				Kerala				India			
	10 years	11-20	21+	Total	10 years	11-20	21+	Total	10 years	11-20	21+	Total	10 years	11-20	21+	Total
No infant death	4.6 (540)	5.0 (451)	5.5 (217)	4.9 (1208)	3.0 (610)	3.6 (615)	4.0 (287)	3.4 (1512)	2.4 (1207)	3.0 (753)	3.9 (258)	2.8 (2218)	3.1 (1819)	3.7 (1818)	4.4 (762)	3.5 (4938)
1^+ infant death	4.9 (152)	5.1 (363)	5.9 (277)	5.3 (792)	3.2 (104)	3.9 (216)	4.4 (167)	3.9 (488)	2.7 (28)	4.1 (109)	4.4 (105)	3.9 (282)	3.9 (324)	4.6 (688)	5.2 (550)	4.6 (1562)

Table 22.2: *Mean Unwanted Babies Born to the Respondents According to Their Age and Number of Living Children in U.P., A.P., Kerala and India*

Living children	U.P.			A.P.			Kerala			India		
	≤34 years	35^+ years	Total	≤34 years	35^+ years	Total	≤34 years	35^+ years	Total	≤34 years	35^+ years	Total
≤2 Children	1.0 (7)	1.0 (1)	1.0 (8)	1.4 (32)	1.8 (8)	1.5 (40)	1.4 (8)	3.0 (1)	1.6 (9)	1.3 (47)	1.8 (10)	1.4 (57)
3 Children	1.2 (28)	1.5 (4)	1.3 (32)	1.4 (31)	1.8 (19)	1.6 (50)	1.3 (18)	1.5 (18)	1.4 (36)	1.3 (77)	1.6 (48)	1.4 (116)
4 Children	1.3 (58)	1.2 (26)	1.3 (84)	1.5 (29)	1.8 (24)	1.6 (53)	1.6 (16)	1.7 (27)	1.7 (43)	1.4 (103)	1.6 (77)	1.5 (180)
5 Children	1.6 (49)	1.5 (49)	1.6 (98)	2.1 (13)	2.2 (20)	2.2 (33)	1.9 (7)	1.9 (15)	1.9 (22)	1.7 (69)	1.7 (84)	1.7 (153)
6 Children	2.0 (18)	1.9 (52)	1.9 (70)	3.0 (4)	2.3 (16)	2.4 (20)	2.3 (3)	2.4 (8)	2.4 (11)	2.2 (25)	2.0 (76)	2.0 (101)
7^+ Children	2.8 (8)	2.4 (43)	2.5 (51)	1.7 (3)	2.6 (12)	2.4 (15)	3.0 (1)	2.5 (6)	2.6 (7)	2.5 (12)	2.4 (61)	2.4 (73)

Table 22.3: *Mean Unwanted Babies Born to Mothers according to Their Age, Number of Living Children and Number of Male and Female Living Children in the U.P., A.P., Kerala and India.*

Number of living children	U.P		A.P.		Kerala		India		
	Male	Female	Male	Female	Male	Female	Male	Female	
No living male/ female child	1.7 (37)	1.4 (23)	1.4 (20)	1.6 (20)	1.6 (10)	1.7 (23)	1.6 (6.7)	1.6 (66)	
1 male/female child	1.6 (65)	1.4 (40)	1.7 (60)	1.7 (65)	1.6 (20)	1.7 (30)	1.7 (145)	1.6 (135)	
2 male/female children	(89)	1.5 (91)	1.4 (70)	1.8 1.7 (67)	1.8 (47)	1.6 (39)	1.8 (206)	1 (197)	7
3 male/female children	(75)	1.5 (97)	1.5 (34)	1.9 1.5 (31)	1.7 (27)	1.6 (26)	1.5 (136)	1 (154)	7
4 male/female children	(51)	1.8 (60)	2.0 (17)	2.3 2.1 (19)	2.5 (18)	2.2 (7)	2.1 (86)	2 (86)	0
5^+ male/female children	2.0 (26)	2.5 (32)	2.6 (10)	1.9 (9)	2.5 (6)	3.0 (3)	2.2 (42)	2.4 (44)	

Table 22.4: *Mean Unwanted Babies Born to the Respondents According to Their Age and Number of Living Children in U.P., A.P., Kerala and India*

Number of babies died	U.P.			A.P.			Kerala			India		
	≤34 years	35⁺ years	Total	≤34 years	35⁺ years	Total	≤34 years	35⁺ years	Total	≤34 years	35⁺ years	Total
No baby died	1.5 (77)	1.9 (33)	1.7 (110)	1.5 (8)	2.0 (4)	1.7 (12)	2.3 (3)	3.0 (1)	2.5 (4)	1.5 (88)	1.9 (38)	1.6 (126)
1 baby died	1.5 (53)	1.6 (64)	1.6 (117)	1.3 (52)	1.7 (40)	1.5 (92)	1.2 (35)	1.6 (47)	1.5 (82)	1.4 (140)	1.6 (151)	1.5 (291)
2 babies died	1.3 (21)	1.9 (33)	1.7 (54)	1.6 (30)	2.1 (29)	1.8 (59)	2.1 (15)	2.2 (18)	2.2 (33)	1.6 (66)	2.0 (80)	1.9 (146)
3 babies died	1.8 (10)	1.7 (23)	1.7 (33)	2.2 (13)	2.4 (13)	2.3 (26)	-	2.6 (5)	2.6 (5)	2.0 (23)	2.0 (41)	2.0 (64)
4 babies died	1.4 (7)	2.4 (14)	1.6 (21)	2.6 (8)	2.8 (9)	2.7 (17)	-	2.0 (4)	2.0 (4)	2.0 (15)	2.5 (27)	2.3 (42)
5⁺ babies died	-	2.3 (8)	2.3 (8)	3.0 (1)	2.3 (4)	2.4 (5)	-	-	-	3.0 (1)	2.3 (12)	2.4 (13)

The respondents constitute parents, who have said that they have one or more unwanted babies. Among them some have lost babies but others have not.

Table 22.5: *Percent Distribution of Mothers on Unwanted Babies by Their Age, Number of Children Working and State.*

Number of total children working	U.P.			A.P.			Kerala			India		
	≤34 years	35⁺ years	Total	≤34 years	35⁺ years	Total	≤34 years	35⁺ years	Total	≤34 years	35⁺ years	Total
No child in 5 to 14 age group	83.3 (10)	1.67 (2)	3.5 (12)	43.5 (10)	56.5 (13)	10.9 (23)	53.8 (7)	46.2 (6)	10.2 (13)	56.3 (27)	43.7 (21)	7.0 (48)
No child labour	57.3 (55)	42.7 (41)	28.9 (96)	55.4 (36)	44.6 (29)	30.8 (65)	39.2 (38)	60.8 (59)	75.8 (97)	50.0 (129)	50.0 (129)	37.8 (258)
1 child working	51.5 (53)	48.5 (50)	30.0 (103)	52.1 (25)	47.9 (23)	22.7 (48)	41.7 (5)	58.3 (7)	9.4 (12)	50.9 (83)	49.1 (80)	23.9 (163)
2 children working	36.8 (21)	63.2 (36)	16.6 (57)	57.1 (28)	42.9 (21)	23.2 (49)	66.7 (2)	33.3 (1)	2.3 (3)	46.8 (51)	53.2 (58)	16.0 (109)
3 children working	34.1 (14)	65.9 (27)	12.0 (41)	38.9 (7)	61.1 (11)	8.5 (18)	33.3 (1)	66.7 (2)	2.3 (3)	35.5 (22)	64.5 (40)	9.1 (62)
4⁺ children working	44.1 (15)	55.9 (19)	9.9 (34)	75.0 (6)	25.0 (2)	3.0 (8)	-	-	-	50.0 (21)	50.0 (21)	6.2 (42)

References

Adlakha, A. L. (1970). *A study of infant mortality in Turkey.* Ph. D.Thesis, University of Michigan.

Agarwala, S. N. (1970). *A demographic study of six urbanising villages.* New Delhi: Institute of Economic Growth, Asia Publishing House.

Agarwala, R. D. (1975). *Influence of infant and child mortality on fertility in India.* Paper presented at the seminar on infant mortality in relation to level of fertility, Bangkok, Paris: CICRED, Series.

Aiyappan, A. and Mahadevan, K. (1988). *Population and social change in an Indian village,* Delhi, Mittal Publications.

Apte, N. V. (1986). Dietary Management, *Science Today,* March 1986, pp. 36-37.

Arnold, et al. (1975). *The value of children: A cross-national study,* Vol. I, Honolulu: East-West Centre.

Bebarta, P. C. (1964). *Family structure and fertility.* Proceedings of the 51st and 52nd sessions of the Indian Science Congress, Part III.

Bongaarts, J. and P. C. Potter (1983). *Fertility, biology and behaviour: An analysis of proximate determinants,* New York Academic Press.

Bose Ashish et al. (1974). *Populations in India's development: 1947-2000.* New Delhi: Vikas Publishing House.

Cain, M. (1981). Risk and fertility in India and Bangladesh, *PDR,* Vol. 7, No.3.

Caldwell, et al. (1985). Fertility transition in South India, *SFP*, New York, Population Council.

Cameron, M. and Hofvander, Y. (1983). *Manual on feeding infants and young children,* Oxford University Press, Delhi.

Chandrasekharan, C. (1948). Parsi demography. *Human Biology* 20: 52-59.

Chandrasekharan, C. (1952). *Cultural patterns in relation to family planning in India* In the report of the Third International Conference on Planned Parenthood, Bombay.

Chandrasekhar, S. (1972). *Infant mortality, population growth and family planning in India.* London: George Allen and Unwin Ltd.

Chaudhury, A. K. M. et al. (1975). *The effect of child mortality experiences on subsequent fertility: An empirical analysis of Pakistan and Bangladesh data.* Paper presented at a seminar on infant mortality in relation to the level of fertility. Bangkok, Thailand, 6-12, May, 1975.

Chowdhury, A. K. M. (1982). The concept of intermediate level variables in mortality studies. In B. Edmonston and R. Bairagi (eds), *Infant and Child Mortality in Bangladesh,* Dacca, University of Dacca.

Chen, C. Lincoln (1983). Child survival: levels, trends and determinants. In *Determinants of fertility in developing countries: a summary of knowledge.* Part-A, Committee on Population and Demography, National Academy Press: 163-190.

Committee on Population and Demography (1982). Socio-economic determinants of fertility behaviour in developing nations: Theory and initial results. Report No. 17, Washington, DC, National Academy, Press.

CMIE, (1983). *Basic statistics relating to Indian economy*, Vol. II, Table No. 148, New Delhi.

Cho, L. J. et al. (1982). *The determinants of fertility in the Republic of Korea*, Report 14, National Academy Press.

CSO, (1981-82). *Report of the Central Statistical Organisation*. New Delhi.

Cronin, T. J., (1969). Influence of lactation upon ovulation, *The Lancet* 2 (1969).

Dandekar, K. (1959). *Socio-economic change in rural areas during three five-year plans.* Poona: Gokhale Institute of Politics and Economics (Unpublished).

Desai, P. B. and Thyagi (1985). *Annotated bibliography of Indian demography.* Bombay, Popular Prakasan.

Desai, P. B. (1978). Social Science Research on Population and Development in Middle South Asia, Appendix-2, International Review Group of Social Science Research on Population and Development: Mexico.

Davis, K. and Judith Blake (1956). Social structure and fertility; an analytical framework. In *Population and society,* (ed.) Charles B. Nam.

Davis, K. (1945). The world demographic transition. *Annals of the American Academy of Political and Social Science,* 237: 1-11.

Driver, E. D. (1963). *Fertility differentials in Central India.* Princeton: Princeton University Press.

Eisenstadt, Richard, A. (1975). *An economic framework for fertility analysis.* New York: Studies in Family Planning.

Eberstadt, N. (1981). *Fertility decline in the less developed countries,* New York: Praeger Press.

El-Minawi, M. F. and Foda, M. S.(1971): Postpartum lactational amenorrhoea, *American Journal of Obstetrics and Gynaecology,* III: 17-21

ESCAP (1982). *Mortality in the South and East Asia: A review of changing trends and patterns, 1950-75.* WHO-ESCAP seminar proceedings, Manila.

Farah, A. M. and Preston, S. H. (1982). *Child mortality differentials in Sudan,* New York: PDR, 8 (2).

Fawcett, James (Ed.) (1972). *The satisfactions and costs of children: Theories, concepts methods.* Honolulu: East-West Population Institute.

Freedman, R. (1961). The sociology of human fertility: A trend report and bibliography. *Current Sociology,* 10/11.

Freedman, R. (1975). *The sociology of human fertility: An Annotated bibliography.* New York: Irvington.

Gioibsa, R. (1964). Breastfeeding and child spacing, *Child and Family* 3 : 1-8.

Hanumantha Rao, et al. (1976). Growth Pattern of well to do Hyderabad Pre-school children. *Ind. J. Med. Res.* 64, 629-638.

Harrington, J. A. (1971). The effect of high infant and childhood mortality on fertility: The West African Case. *Demography,* 3: 22-25.

Jacqueline, M. Mondot Bernad (1977). *Relationship between fertility, child mortality and nutrition in Africa,* Paris, OECD.

Jain, S. P. (1974). Some aspects of mortality In A. Bose, P. B. Desai, A. Mitra and J. N. Sharma (eds.) *Population in India's Development: 1947-2000,* New Delhi: Vikas Publishing House.

IIPS. (1985). *Fertility and family planning in the states of Gujarat, Rajasthan, Bihar and Orissa* (Mimeo).

Iskandar, N. & Gavin, W. Jones (1977). Effect of infant and childhood mortality on subsequent fertility in Indonesia, *Majalah Demografi Indonesia* 7 (Tahun Ke-4): 1-24.

Jelliffe, D. B. and Jelliffe, E. F. P. (1978). *Human milk in the modern world.* Oxford: Oxford University Press.

Kane, P.V. (1974). *History of Dharmasastra,* Vol. II, Part I second edition. Poona: Bhandarkar Oriental Research Institute.

Khan, M. E. (1973). Factors affecting spacing in births. *Journal of Family Welfare,* 20: 54–57.

Kohli, K. C. (1977). *Mortality in India, A state-wise study,* Sterling Publishers Pvt. Limited, New Delhi.

Kurup, R. S. and George (1969). Variation in fertility between two generations. *Journal of family welfare,* XV, Population Growth in Kerala: Its Implications, Demographic Research Centre, Bureau of Economics and Statistics, Trivandrum.

Kurup, R. S. (1986). Demographic transition in Kerala in *Fertility and mortality: theory, methodology and empirical issues.* Sage Publications, New Delhi.

Lapham, R. J., N. H. Wright, M. D. & S. Quandt (1975). The Influence of special Mortality reduction programme on Fertility: An Initial look at some empirical data and measurement problems. Paper presented at the Seminar on Infant mortality in relaion to the level of fertility, Bangkok, Paris: CIRCED, Series, pp. 247-261.

Lechtig Aron, et al. (1977). Effect of maternal nutrition on infant mortality, in Hentry Mosley, W., *Nutrition and human reproduction,* Plenum Press, pp. 147-174.

Lesthaeghe, R. (1975). *Infant mortality and marital fertility decline in Belgium, 1880-1910. A short research note,* Brussels: Vriji University Brussel (Mimeo).

Mahadevan, K. and Dutt, P. R. (1972). Sociological appraisal on raising age at marriage, *Bulletin, GIRH & FP,* Vol. vi.

Mahadevan, K. (1979). *Sociology of Fertility: Determinants of differential fertility in South India.* New Delhi: Sterling Publishers Pvt. Limited.

—— (1984). Mortality, biology and society: Analytical framework and conceptual model, Paper presented at a seminar in S.V. University, India.

—— (1985). *Infant and childhood mortality in India.* Delhi, Mittal Publications.

Mahadevan, K., et al. (1986). *Fertility and mortality: Theory, methodology and empirical issues,* New Delhi : Sage Publications.

—— (1986). *Determinants of religious and caste differentials in fertility in a village in Rayalaseema of Andhra Pradesh* in Mahadevan, K. 1986.

Mahadevan, K., M. Sumangala (1987). *Social development, cultural change and fertility decline*, New Delhi : Sage.

Mandelbaum, D. (1972). Society in India (Ed.) Popular Prakashan, Bombay and Human Fertility in India-Social Components and policy perspectives (ed.), 1974.

Mandelbaum, David, G. (1970). *Society in India*. Berkeley: University of California Press.

Manu, Quoted in *History of Dharmasastrai* Vol. I, Part II, Chapter IX: 427-550, by P.V. Kane, Bhandarkar Oriental Research Institute, Poona, 1974.

Misra, B. D. (1982). *Organization for change*. Radiant Publishers.

Mosley, W. H. (ed.) (1977). *Nutrition and Human Reproduction.* New York: Plenum Press.

Mosley, W. H. (1979). Health, nutrition and mortality in Bangladesh. In Sirageldin (ed.). *Research in Human capital development.* Greenwich: Jai Press.

Murthy, R. K. and Rao (undated). *Study of fishermen community in Coastal Andhra Pradesh* (Mimeo).

Nag, Moni (1965). *Family type and fertility* In proceedings of the second world population conference, New York, United Nations (Vol. II), 1967.

Nag, et al. (1978). An anthropological approach to the study of the economic value of children in Java and Nepal. *Current Anthropology*, Vol. 19, No. 2.

Naidu, D. A. (1986). Child labour and fertility in A.P. In *Fertility and Mortality, Theory, methodology and empirical issues*. New Delhi, Sage Publications.

Namboodiri, N. K. (1960). *Fertility differentials and determinants in Kerala* (Mimeo).

Nayar, P. K. B. (1986). Factor in fertility decline in Kerala in *Fertility and Mortality: Theory, Methodology and Empirical Issues*. New Delhi: Sage Publications.

NNMB (1980). NNMB report for the year 1980, Section I dietary and nutritional status of population in different states – Mean anthropometric measurements by age, pp. 26, 32 & 40.

Notestein, F. W. (1945). Population: the long view, pp. 36-57 in Theodore, W. Schultz, (ed.), *Food for the World*. Chicago: University of Chicago Press.

Omran, A.R. and Standley, C.C. (1976). *Family formation patterns and health*. Geneva: WHO.

PAHO (1973). *Patterns of mortality in childhood*. Report of the Inter-American Investigation of Mortality in Childhood, Science Publication No. 262, Washington.

Pakrasi, K. & Malekar, G. (1967). "The relaionship between family type and fertility. *Milbank Memorial Fund Quarterly*.

Perez, A. Vela, P. Masuick, G. S. and Potter, R. G. (1972). First ovulation after child birth: The effect of breastfeeding, *American Journal of Obstetrics and Gynaecology*, 114: 1041-1047.

Prema, K., Neelakumari, S. and Naidu, A. N. (1979). Lactation and fertility. *American Journal of Clinical Nutrition*, 32: 1298-1303.

Prema, K. and Philips, F.S. (1980). Lactational amenorrhoea A Survey. *Indian Journal of Medical Research*, 538-546.

Prema, K. & Ravindranath, M. (1982). The Effect of Breastfeeding Supplements on the Return of Fertility. *Studies in Family Planning*, Vol. 13, No. 10.

Preston, S. H. (1975). The changing relation between mortality and fertility trends. Public Health Reports, 831: 715-27.

Preston, S. H. (1976). *Mortality patterns in national population: with special reference to recorded causes of deaths*. New York: Academic Press.

Preston, S. H. (1978). *Mortality, morbidity and development.* Presented at a Seminar on Population and Development in the WCWA Region (Mimeo).

Poti, B. J. (1976). *International classification of diseases*, Lecture delivered in National Institute of Nutrition, Hyderabad (Mimeo).

Rao, N. B. et al. (1986). *Determinants of Fertility Decline: A study of Rural Karnataka*. South Asia Publishers.

Reddy, P. J. (1986). *Socio-psychological determinants of urban fertility In Fertility and Mortality: Theory, Methodology and Empirical Issues*: New Delhi: Sage Publications Pvt. Ltd.

Rele, J. R. and Kanitkar (1980). *Fertility and Family Planning in Greater Bombay*, Popular Prakashan.

Rutstein, S. O. (1974). The influence of childhood mortality on fertility in Taiwan", *Studies in family planning*, 5: 182.

Ruth, et al. (1983). On the Institutional Analysis of Population Programmes, *PDR*, 9, No. 3

Ruzicka, L. T. and Kanitkar, T. (1972). Infant mortality in the urban setting: the case of Greater Bombay. In K. E. Vaidyanadhan (ed.), *Studies on Mortality in India*, GIRH & FP Monograph.

Ruzicka, L. T. (1979). *Nuptiality and Fertility*, Belgium: Ordina Editions.

Schultz (ed.) (1974). Marriage, family, human capital and fertility. *Journal of Political Economy*, March/April 1982 (2), Part II.

Shanti Ghosh (1981). Anthropometric assessment of growth and nutritional status in infancy and childhood, *Feeding and care of infants and young children*, Fourth edition, VHAI, New Delhi, 7-12 and 98-11.

Simmons, George, et al. (1979). Some aspects of infant and childhood mortality in rural North India. *Social Action*, Vol. 29, 249-69.

Srinivasan, K. et al. (1978). From one generation to the next: Changes in fertility, family size preferences, *SFP* 9 (10-11), 258-271.

Smucker, et al. (1980). Neonatal mortality in South Asia. The special role of tetanus, *Population Studies*, 34(2).

SRS (1979). Office of the Registrar General of India, Survey Report on levels, trends and differentials in fertility. Ministry of Home Affairs, New Delhi.

SRS, (1981). Vital Statisticai Division, Office of the Registrar General of India, Ministry of Home Affairs, New Delhi.

Taylor, C. E., et al. (1978). The Narangwal experiment on interaction on nutrition and infection: Project design and effects upon growth. *Indian Journal of Medical Research*, 68 (Supplement): 1-20.

Thurston, Edgar. (1909). *Castes and tribes of Southern India. Seven volumes. Madras: Government Press.* United Nations (1961). *The Mysore Population Study*, New York.

U.N's Department of Economic and Social Affairs, 1972.

Usharani, D. (1986). Cost of rearing children and fertility, in *Fertility and Mortality: Theory, Methodology and Empirical Issues*: New Delhi: Sage Publications.

Vallin, Jacques, et al. (1985). La Lutte Contre. la Mort., Paris Univiersity de France.

Vlassoff, M. and Vlassoff, C. (1980). Old age security and the utility of children in rural India. *Population Studies*, 34: 487-499.

WHO (1980). *Manual of mortality analysis*, Geneva.

World Fertility Survey (1980). World Fertility Survey Conference, 1980, Record of Proceedings, Vol. 3, London.

Wray, D. Joe (1977). Maternal nutrition, breastfeeding and infant survival. In *Nutrition and Human Reproduction* (ed.) W.H. Mosley, New York: Plenum Press.

Wyon, J. B., Gordon, J. E. (1971). *The Khanna Study: Population Problems in the rural Punjab*, Harward University Press.

Zachariah, K. C. (1983). *Anomaly of the fertility decline in Kerala*. Washington: World Bank.

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